VOL. X, No. 2 DECEMBER, 1939

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1938

HONOLULU, HAWAII

PRICE $2.00

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1938

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Vice-President.....F. A. Bianchi
Secretary-Treasurer.....Dr. F. X. Williams
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Willard, H. F.
Williams, F. X.
Zimmerman, E. C.

All correspondence should be addressed to the Secretary, Hawaiian Entomological Society, Honolulu, Hawaii, from whom copies of the Proceedings may be purchased.

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Volume IX, 1934–36 (in three numbers), contains 468 pages, 19 plates, and 25 cuts.

Volume X, No. 1, 1937, contains 174 pages, 11 plates, and 10 cuts.

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PROCEEDINGS

OF THE

Hawaiian Entomological Society

VOL. X, NO. 2 FOR THE YEAR 1938 DEC., 1939

JANUARY 6, 1938

The 385th regular meeting of the Hawaiian Entomological Society was held at the Experiment Station, H.S.P.A., January 6, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Ethel Lucas, Messrs. Bryan, Browne, Ehrhorn, Holdaway, Illingworth, Keck, Marlowe, Mason, Pemberton, Rosa, Schmidt, Swezey, Van Zwaluwenburg, Williams, and Zimmerman.

Visitor: H. Darwin Kirschman.

The minutes of the previous meeting were read and approved.

The Secretary announced that the Executive Committee had appointed the following officers: Editorial Committee: O. H. Swezey, Editor, E. H. Bryan, Jr., R. H. Van Zwaluwenburg; Curator of collections, F. X. Williams; Librarian, J. S. Rosa.

The Executive Committee also had approved for payment a bill for $193.45 from the Honolulu Star Bulletin for printing 500 copies of Proc. Hawaiian Entomological Society index for Vol. IX.

PAPER PRESENTED

Mr. E. C. Zimmerman presented a paper entitled: "The Rediscovery of *Mauia* in Hawaii (Coleoptera: Anthribidae)."

NOTES AND EXHIBITIONS

Erebus odora (Linn.).—Mr. O. H. Swezey read a letter from Bro. Matthias Newell in which he wrote that he had observed what was most probably *Erebus odora,* many years ago, at Hilo, Hawaii. This considerably antedates the recorded establishment of this moth here in 1928. President Schmidt suggested that Mr. Swezey reply to this interesting letter of Bro. Newell, who is an honorary member of the Society and a keen and accurate observer, and send him the regards of the Society. He further suggested that Bro. Newell be persuaded to write memoirs of his early observations in Hawaii.

Gibbium psylloides (Czemp.).—Mr. Van Zwaluwenburg exhibited numbers of this rare and curious ptinid beetle, obtained on January 5, 1938, by Messrs. Whitney and Caum in a mixture of commercial fertilizer and sulfur. The fertilizer was a special mix-

ture containing large amounts of bone meal and other organic material. The species is cosmopolitan, and occurs throughout the mainland United States. It is found in warehouses, feeding on woolen goods and on other dried animal materials. Only three other specimens are in the H.S.P.A. Experiment Station collection; they were collected singly by Mr. Swezey at Kaimuki, Honolulu, in 1909, 1910, and 1911.

Sylepta aurantiacalis Fisch.—Mr. Swezey exhibited specimens of this pyralid moth which had been handed him for identification by the plant quarantine department. They had been reared from caterpillars brought as food for birds by a passenger on steamer from Japan. A pair of parasites were exhibited also which he had reared from the same lot of caterpillars, the parasites being *Exeristes roborator* (Fab.), a pimpline, which at one time was introduced from Europe to the United States as an enemy of the European corn borer.

Plusia giffardi Swezey.—A specimen of this moth was exhibited by Mr. Swezey. It had issued from a cocoon brought down by Dr. Williams from the mountains, above Mapulehu, Molokai, Dec. 19, 1937. This is the first record of this moth from Molokai. It has previously been collected at Kilauea, Hawaii, and Kaupo, Maui.

Vanessa tammeamea Esch.—Mr. Swezey exhibited a specimen of this native butterfly which was captured by Mrs. Swezey, Dec. 30, 1937, on the porch of their residence in lower Manoa. This butterfly is rarely found so far from its natural habitat in the mountain forests.

New Scolytid.—Mr. Swezey exhibited specimens of a small scolytid beetle which appears not to have been collected before in Hawaii. His specimens were reared from a decaying avocado seed on the ground in his garden, 245 beetles having issued from the one seed. It appears to belong to the subfamily Crypturginae.

Eumerus marginatus (Grimshaw).—Mr. A. C. Browne reported that on Dec. 1, 1937, samples of ginger root grown at Kalahina, Puna, Hawaii, were received, in which maggots were abundant. Rearing the material out, it was found that the syrphid *Eumerus marginatus* was abundant. This is believed to be the first record of this fly appearing in ginger. The following other diptera were also taken:

1. *Neoexaireta spinigera* (Weideman) Fam. Stratiomyiidae.
2. *Euxesta quadrivittata* (Macquart) Fam. Ortalidae.
3. *Atherigona excisa* (Thompson) Fam. Anthomyiidae.
4. *Neosciara molokaiensis* (Grimshaw) Fam. Sciaridae.

Anthonomus eugenii (Cano).—Mr. A. C. Browne reported that young fruits of long eggplant at Waialua, Oahu, were found to be very severely stunted, deformed and scarred. Material taken on Dec. 1, 1937, was held for observation. In addition to *Anthonomus eugenii* which emerged in some numbers, the following forms also were reared:

1. *Araecerus fasciculatus* (Fam. Anthribidae).
2. *Cryptomorpha desjardinsi* (Fam. Cucujidae).
3. *Scymnus bilucernarius* (Fam. Coccinellidae).
4. *Phthorimaea operculella*, male (Fam. Gelechiidae).
5. *Ereunetis minuscula* (Fam. Tineidae).
6. *Pyroderces rileyi* (Fam. Cosmopterygidae).
7. *Petrochroa dimorpha* (Fam. Tineidae).
8. *Zatropis tortricidis* (Pteromalidae).

A species of mite (undetermined) and *Pseudococcus maritimus* (Ehrhorn) were also taken from the fruit, where they were sheltered by the fleshy sepals.

Polistes wasps.—Dr. F. X. Williams stated that on a visit to Mapulehu, Molokai, in December, 1937, he noticed *Polistes* wasps grouped on old nests and in angles of rafters of the lanai of the H.S.P.A. residence. A closer examination of these semi-hibernating wasps showed them to be mainly the darker species, *P. macaensis* (Fabr.) and (or) *hebraeus* Fabr., but that here and there in intimate association with them were a very few of the smaller yellow and black species, *P. fuscatus* (Fabr.) var. *aurifer* (Sauss.).

Lathyrophthalmus aeneus (Scop.).—Mr. E. H. Bryan, Jr., remarked that he had observed this syrphid fly hibernating locally for a time. This species hibernates also on the mainland.

Muscoid flies.—Mr. Bryan reviewed Dr. Charles Townsend's Manual of Myiology, part V, Sao Paulo, 1937, which contains diagnoses and data about muscoid genera from the Glossinini to Agriini (families Glossinidae, Gastrophilidae, Muscidae, Rhiniidae, Calliphoridae, and Stephanostomatidae).

Book review.—Dr. F. G. Holdaway briefly reviewed and exhibited a book by R. E. Snodgrass—"Insects, Their Ways and Means of Living," 1934.

FEBRUARY 3, 1938

The 386th regular meeting of the Hawaiian Entomological Society was held at the Experiment Station, H.S.P.A., on February 3, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Ethel Lucas, Miss Amy Suehiro, Messrs. Bryan, Chock, Donaghho, Ehrhorn, Holdaway, Illingworth, Marlowe, Pemberton, Rosa, Sakimura, Schmidt, Swezey, Williams, and Zimmerman.

Visitors: J. R. Garcia, Jr., and J. Manson Valentine.

The minutes of the previous meeting were read and approved.

Mrs. Helen B. Schmidt was elected to regular membership in the Society.

PAPERS PRESENTED

On behalf of Mr. R. H. Van Zwaluwenburg, Dr. F. X. Williams presented a paper entitled: "Key to Larvae of Hawaiian Elateridae (Coleoptera)."

Mr. E. C. Zimmerman presented a paper entitled: "The Genus Apion in Fiji (Coleoptera: Curculionidae)."

NOTES AND EXHIBITIONS

Mr. Walter Donaghho exhibited carabid beetles and *Odynerus* wasps he had collected on Kauai and Elateridae collected on Molokai.

Dr. F. G. Holdaway exhibited a fine treatise by Dr. Cleveland on Protozoa in Wood-Eating Cockroaches, the same species of protozoa being found also in termites, thus further accentuating the natural relationship between the Blattidae and the termites.

President Schmidt introduced Dr. J. Manson Valentine, Fellow at the B. P. Bishop Museum. Dr. Valentine told of his collecting and faunistic studies in Fiji and New Zealand. His particular interest was in the Caraboidea (Coleoptera), of which many species were added to the Fijiian fauna. Here on Viti Levu two types of ecological habitats were easily recognizable: the north side dry and cultivated or much overgrown with bracken, and the dense forest above this area and extending over the Island. A good deal of hands-and-knees collecting was necessary on the forest floor. There were also arboreal Carabidae, and one species of carabid associated with a savage ant. Two species of Cicindellidae here—the larvae in clay of paths and roadsides.

In New Zealand about 30 different collecting localities were visited on the North Island. Many new carabids collected. Mt. Edgemont was found rich in carabids except on upper slopes.

Upon inquiry by Dr. Schmidt re the status of the *Levuana* moth in Fiji, Dr. Valentine stated that none of this coconut pest was seen, it being under excellent control by imported parasites.

Taro leafhopper enemies.—Mr. Q. C. Chock spoke of D. T. Fullaway's shipments of insect enemies of the Taro leafhopper. To date, Mr. Fullaway had made 5 shipments from the Philippines. There were two egg-parasites (*Ootetrastichus* & *Paranagrus*), and a *Cyrtorhinus* egg-sucking bug. The bug was easily reared and very promising. *Paranagrus* also being reared. It has a life-cycle of 17–18 days.

Dr. Schmidt exhibited an interesting "entomological Christmas card" from Dr. Mendes to Dr. R. N. Chapman.

Ants of Guam.—Mr. Swezey exhibited a collection of ants made in Guam in 1936. It contained all but 2 species of the list of 21 recorded by Dr. Wheeler in 1912 that were collected by Mr. Fullaway in 1911. Besides, there were 7 species not previously recorded, making a total of 26 species for the present lot. Eleven of these also occur in Hawaii. Although 35 species have been recorded in Hawaii, yet in Guam with a smaller number of species, ants seem much more abundant. Many of the species are pretty generally met with and specially abundant. There may be several

species present at a given place and time, as for example: It was common to collect half a dozen species under bark or in rotten log at one time; 9 species were collected in the garden one afternoon; 6 species collected in dead bamboo stumps at one time; 6 species were collected in the residence, 3 of them specially abundant all the time.

MARCH 3, 1938

The 387th regular meeting of the Hawaiian Entomological Society was held at the Experiment Station, H.S.P.A., on March 3, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Ethel Lucas, Miss Amy Suehiro, Messrs. Bianchi, Bryan, Donaghho, Ehrhorn, Holdaway, Illingworth, Keck, Marlowe, Mason, Pemberton, Rosa, Schmidt, Swezey, Van Zwaluwenburg, Williams, and Zimmerman.

Minutes of previous meeting read and approved.

PAPER PRESENTED

Mr. E. C. Zimmerman presented a paper entitled: "A Review of the Hawaiian Mycetophagidae (Coleoptera)."

NOTES AND EXHIBITIONS

Metriona bicolor (Fab.).—On behalf of Mr. Noel Krauss, Mr. R. H. Van Zwaluwenburg exhibited a chrysomelid beetle recently found on Mr. Krauss' trousers cuff, at Merchant & Bishop Sts., Honolulu, Feb. 10, 1938.

Eriophyes sp.—Litchi leaves badly infested by burrowing mites were exhibited by Dr. Illingworth. This is an oriental pest that has been in Hawaii for many years. Specimens were brought to the College of Hawaii in 1916 by Mr. Higgins, who published a bulletin on the Litchii, July 27, 1917. He sent specimens of the mite to Dr. L. O. Howard, who reported that the mite is apparently an undescribed species of *Eriophyes.*

Apanteles sp. on potato tuber moth.—Mr. Pemberton exhibited specimens of a braconid reared from Irish potatoes infested with potato tuber moth larvae, collected in a potato field at Oahu Sugar Co., Ltd., February 14, 1938. This parasite appears to be a species of *Apanteles* introduced into Hawaii from Southern California in 1933 by D. T. Fullaway, for control of the potato tuber moth. This is the first record of field recovery of the species in Hawaii. In addition, small numbers of *Pristomerus hawaiiensis* Perkins and *Chelonus blackburni* Cam. were reared from this material.

Parasites of the cactus scale Diaspis echinocacti (Bouché).—Mr. Swezey exhibited a branch of *Epiphyllum* infested with the cactus scale, from which two kinds of parasites had issued: *Aspidiotiphagus agilior* Berlese, quite numerous from the male scales; and a few of an undetermined encyrtid from the female scales. The latter appeared to be a species not heretofore recorded in Hawaii.

Cryptogonus nigripennis Weise.—Mr. Swezey reported that this little black ladybeetle is now so well established at Hanalei, Kauai, on coconut trees infested with *Pinnaspis buxi* (Bouché) that they are being collected by the thousands for distribution, by entomologists of the Board of Agriculture and Forestry. This is the ladybeetle sent by Mr. Swezey, November 1936, from Guam, where it is efficient in controlling *Aspidiotus destructor* Sign., a scale that at one time was very destructive to coconut trees on Saipan. This scale was prevented from becoming serious on Guam by this little ladybeetle.

Bufo marinus.—Mr. F. A. Bianchi spoke of a record size *Bufo marinus* he recently found at Kapiolani Park, Honolulu. It was nearly 7½ inches long, 15½ inches in girth, and weighed about 2½ lbs.

APRIL 7, 1938

The 388th regular meeting of the Hawaiian Entomological Society was held at the Experiment Station, H.S.P.A., on April 7, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Messrs, Bryan, Ehrhorn, Hadden, Illingworth, McBride, Pemberton, Rosa, Sakimura, Schmidt, Swezey, Williams, and Zimmerman.

Visitors: Richard A. Cooke, Jr., H. Darwin Kirschman, and J. M. Valentine.

Minutes of previous meeting read and approved.

PAPERS PRESENTED

Mr. O. H. Swezey presented a paper entitled: "Sclerogibbidae, a Hymenopterous Family New to Hawaii."

Mr. E. C. Zimmerman presented a paper entitled: "Blepiarda of Fiji."

NOTES AND EXHIBITIONS

Dermestes vulpinus Fab.—Mr. K. Sakimura exhibited some shavings of dried bonito fish obtained in Honolulu infested by this dermestid beetle.

Plagiomerus diaspidis Crawford.—Mr. Swezey reported that Mr. Timberlake had determined for him as this species, the parasite of the cactus scale which he had exhibited at the March meeting. Timberlake had previously reared it from the same scale in greenhouse at Washington, D. C., and Crawford described it from the cactus scale also, which makes it appear to be attached to this scale. A closely related species (*P. hospes*) was described by Timberlake in Hawaii in 1920, from caught specimens, the host not being known.

Catorama mexicana Chev.—Dr. Illingworth exhibited books injured by the larvae of this anobiid beetle. When the library of Dr.

Wm. T. Brigham, sent to Boston in 1927, was unpacked it was found badly damaged by this beetle. R. L. Taylor, of Bussey Institution, Harvard, reported the matter in the Jour. Econ. Ent. Vol. 21, pp. 626–27. He considers that *mexicana* may be a synonym of *C. herbarium* of the West Indies and Brazil. He was informed by the U. S. National Museum many years ago that *mexicana* was a manuscript name never published.

Proscopus veitchi Jordan.—Mr. Zimmerman reported finding a specimen of this anthribid on an unidentified exotic shrub beneath a coconut tree in Foster Gardens, Honolulu, March 19th. This was the first record of the occurrence of this species in Hawaii. It is widely distributed in Polynesia from Fiji eastward through Samoa, the Society Islands to the Marquesas and Mangareva Islands. Mr. Zimmerman collected the species in numbers from dead banana leaves and dead coconut fronds in southeastern Polynesia. The species is probably established on coconuts about Honolulu and may have a wider distribution in our islands. Mr. Zimmerman has included the species in his "Key to the Genera of Hawaiian Anthribidae" in the "Proceedings" for 1937. This species can only be confused with *Exillus lepidus,* in Hawaii, but can easily be distinguished from that species by its elongate, rather than globose, first antennal segment, its lateral prothoracic carina which extends to the apex instead of not past the middle, by the antennae being inserted on the front of the head near the tops of the eyes instead of on the sides of the rostrum, by the eyes which are entire instead of deeply emarginate below and numerous other characters. This insect is evidently a scavenger that feeds on the dead tissues of such materials as dead fronds of coconut and dead banana leaves and is probably of no economic importance.

Apanteles scutellaris Muesebeck.—Mr. Pemberton reported that material of this braconid, which he had reared from potato tuber moth larvae *Phthorimaea operculella* (Zell.), collected at Oahu Sugar Co., Ltd., and mentioned at the previous meeting of this Society, had been sent to Mr. P. H. Timberlake for determination. In a letter dated March 15, 1938, Mr. Timberlake states that the species is as above. This was introduced into Hawaii by the Territorial Board of Agriculture and Forestry from Riverside, California, during 1933. Mr. Pemberton stated that while examining Irish potato plants in Field 39, Oahu Sugar Co., Ltd., in company with Dr. F. G. Holdaway, on March 29th, this parasite was seen in great numbers actively flying over the field and running about on the plants. As many as a dozen could frequently be seen resting on a single plant. There is ample evidence that this introduction is proving of definite value in tuber moth control. The half-grown leaf-mining larvae are attacked and thus prevented from boring into the main stem, which would often result in the splitting apart of the plant and the complete loss of a large amount of the foliage.

Eupristina verticillata Waterst.—Mr. Pemberton exhibited specimens of this agaonid, which is the pollinator of the so-called Chinese Banyan, *Ficus retusa*. During the month of March, 1938, Mr. D. T. Fullaway shipped fruits of this tree from Mayondon, Philippine Islands, to Hawaii, from which several thousand living females of this insect were bred and liberated in *retusa* trees about Honolulu, in an effort to establish the species in order to induce this tree to produce viable seed as part of a reforestation project. It is yet too early to know the results of this work.

Bufo marinus Linn.—Mr. Pemberton stated that he had recently observed adults of this toad consuming quantities of its own young at the border of a pond where toads were abundant, but where insect food was rare.

Chersodromia hawaiiensis.—Dr. F. X. Williams said that Dr. A. L. Melander was describing the empid fly found on Oahuan sea beaches as *Chersodromia hawaiiensis*. The two pairs of paratypes were being divided between the Bishop Museum collection and that of the Hawaiian Entomological Society. He also remarked on the fine development of the Hawaiian dolichopodid genus *Eurynogaster* Van Duzee (1933), about the Gunnera spring at 3600 ft. on Mt. Kaala, Oahu. Path species are not highly metallic in coloration, but those frequenting dripping wet banks and shaded springs, where high lights prevail, are brilliantly purplish green or (and) bluish. Of the latter some half dozen or more frequent this spring. *Eurynogaster binodata* Parent frequents the steep wet rocks along the Kaluanui stream, Koolau Mts., at an altitude of about 2000 ft. It lays its amber colored eggs on the low moss-like growth on wet shaded boulders. It is the largest species of the genus, now numbering 16 or more species. Twenty-nine new species of Hawaiian Dolichopodidae are being described by Abbe Parent bringing the total for the family in the Territory to approximately 90 species. Specimens of *Eurynogaster* were exhibited.

Brachymeria obscurata (Walk.).—Mr. J. S. Rosa stated that he recently found pupae of *Omiodes blackburni* (Butl.) parasitized 14% by this chalcid wasp.

Mr. E. C. Zimmerman gave a brief review of Torre Bueno's Glossary of Entomology.

Mr. F. C. Hadden, here on a vacation from Midway Island, gave a very interesting talk on that Island, composed of Sand Is. and Eastern Is., explaining the building up effect of the bush *Scaevola frutescens* (Miller). Some of the few species of plants and insects were touched upon. The climate is much cooler than here, and sand and windstorms sometimes occur.

May 5, 1938

The 389th regular meeting of the Hawaiian Entomological Society was held at the Experiment Station, H.S.P.A., May 5, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Ethel Lucas, Miss Amy Suehiro, Messrs. Browne, Bryan, Ehrhorn, Hadden, Holdaway, Illingworth, Keck, Marlowe, Mason, McPhail, Pemberton, Rosa, Schmidt, Swezey, Van Zwaluwenburg, Williams, and Zimmerman.

Visitors: William C. Look, Philip M. Weber.

The minutes of the previous meeting were read and approved. It was voted unanimously to re-instate Mr. M. McPhail as a regular member of the Society. He was formerly a member, but has been away for several years.

The matter of recording purposeful introductions of insects and other invertebrates into the Territory was brought up. Mr. E. H. Bryan, Jr., made a motion that these purposeful introductions be recorded and kept up to date, commencing with the revised list made by Mr. O. H. Swezey in May 1929, and that the president of the Society appoint a committee to that end, the members thereof representing the Institutions concerned in these introductions. Seconded by Mr. R. H. Van Zwaluwenburg and passed.

PAPER PRESENTED

Mr. E. C. Zimmerman presented a paper entitled "A New Oodemas from Oahu (Coleoptera: Curculionidae)."

NOTES AND EXHIBITIONS

Ceratitis capitata Wied. in Kamani fruits.—Mr. R. H. Marlowe presented the following data: From June 10 to November 26, 1934, a record was made of the yield and the approximate number of *C. capitata* pupae obtained from the fruit, of an India Almond or Kamani nut tree (*Terminalia catappa*) located at 597 South King St. The tree is about 75 feet high and 40 feet in diameter. The fruit were collected at one to three day intervals. Random samples from each collection were held for infestation counts.

Some nuts matured and dropped before June 10 and after November 26. However, practically all of the fruit matured between June and November. The total number of nuts collected was about 46,800. From these, approximately 337,280 fruit fly pupae were obtained or an average of 7 pupae per nut. The data for the months are: June—13,450 nuts, 122,400 pupae; July—3,700 nuts, 49,215 pupae; August—3,625 nuts, 88,440 pupae; September—4,225 nuts, 17,875 pupae; October—15,750 nuts, 47,250 pupae, and November —6,050 nuts, 12,100 pupae. The infestation of the first crop which was from June to the middle of September, was as high as 25 larvae per nut. The fruit of the second crop were small, hard and flat. The average infestation was from 1 to 4 larvae per fruit.

Willard and Mason in 1933 (Parasitization of the Mediterranean Fruit Fly in Hawaii 1914–33, U.S.D.A. Circular No. 439, 1937) found that 69.4 per cent of the fruit fly larvae in India almonds were parasitized by the various fruit fly parasites. Thus, estimating

that approximately 30 per cent of the 337,280 pupae were not parasitized, the Kamani nut tree produced a potential population of over 100,000 adult fruit flies.

Apanteles glomeratus (Linn.) on Oahu.—Dr. Holdaway and Miss Suehiro reported that numerous *Apantales glomeratus* (L.), the introduced parasite of the cabbage worm *Pontia rapae,* were bred out of a parasitized caterpillar taken at Waipahu on broccoli, April 20, 1938. This is the first recovery of the parasite on Oahu since it was introduced by Mr. Fullaway from Japan in 1923. In 1934, it was collected by Mr. Swezey on Hawaii, from various localities, this being the first indication that it was established here. The Oahu specimens were compared with those in the H.S.P.A. collection by Mr. Swezey, and identified as *A. glomeratus. Pontia rapae* was first noticed in Hawaii in 1898. Same year 4 parasites were introduced: *Apanteles congregatus, Apanteles glomeratus, Copidosoma truncatellum, Pteromalus puparum.*

Of these, only *Pteromalus puparum,* a very small lot, became established. Recorded in 1904 but not seen since. Further introductions of this made in 1910 and 1918, but introductions apparently not successful.

In 1923 Mr. Fullaway made a further attempt to introduce *Apanteles glomeratus.* In 1934, 11 years after its introduction, it was recovered by Mr. Swezey on Hawaii and in 1936 on Maui. The present record is apparently the first of its occurrence on Oahu.

Aonidiella inornata McKenzie.—Miss Suehiro reported this as the new name for the scale insect known in Hawaii as *Chrysomphalus aurantii* (Mask.). In McKenzie's description of *inornata* from the Philippines, it is stated that specimens known in Hawaii as *Chrysomphalus aurantii* (Maskell) probably belonged to this species. (Microentomology, Vol. III, Pt. I, p. 10, 1938.)

Oxacis collaris (Sharp).—Mr. Van Zwaluwenburg reported that on April 13 Mr. Rosa and he observed large numbers of this usually uncommon oedemerid beetle at Niu on the identical coconut trees on which Mr. Pemberton found them so abundantly on July 12, 1937. There were literally thousands of the insects on the palm fronds in July, whereas in April they were present in hundreds. By keeping track of similar outbursts in the future, it may be possible to get an inkling of the number of generations which this little-known beetle produces annually.

Carpophilus maculatus (Murray).—Dr. Ashley C. Browne exhibited a macadamia nut in which he had found this beetle. The nut, smooth and sound, showing no perforation, was secured from a commercial bin in Honolulu.

Orchidophilus aterrimus (Waterh.).—Mr. Swezey exhibited a vial of this orchid weevil recently collected by Dr. H. L. Lyon from *Spathoglottis* growing in the open at his home on Matlock Ave. (46 beetles in the lot). He also exhibited several pseudobulbs of this

orchid which had been destroyed by the larvae of the weevil, and one cut open to show a larva at work.

Dioctes chilonis Cushman.—Mr. Swezey exhibited a male specimen of this rice borer parasite which he had collected from *Lobelia gaudichaudii* near the upper end of the Kipapa Trail which follows up the Waipio-Waiawa Ridge. The trade wind had probably carried this parasite up from the cultivated land below on the windward side of the island, where at present very little if any rice is grown. There is also a possibility that this parasite has taken to breeding on some native caterpillar in the forest of that region.

Termite flight.—Mr. E. M. Ehrhorn remarked that the evening of May 4, which was sultry, was the biggest termite night of the season in Honolulu.

Enallagma civile (Hagen).—Mr. J. S. Rosa recorded this immigrant damselfly as very numerous at Waialua and Kahuku, Oahu. Specimens were shown.

Anomala orientalis (Waterh.).—Dr. C. Schmidt mentioned finding the larvae of this beetle in a pineapple field on Oahu.

African Coccinellidae.—Dr. Schmidt exhibited Coccinellidae—as yet not liberated—that were collected in Africa as enemies of the pineapple mealybug, *Pseudococcus brevipes*, here.

JUNE 2, 1938

The 390th regular meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, Honolulu, June 2, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Ethel Lucas, Miss Amy Suehiro, Messrs. Bianchi, Browne, Ehrhorn, Fullaway, Holdaway, Illingworth, Ito, McBride, Rosa, Sakimura, Schmidt, Swezey, Van Zwaluwenburg, Williams, and Zimmerman.

Visitors: Miss Mabel Chong, Messrs. F. K. Lee, Wm. A. Look, and Philip W. Weber.

The minutes of the preceding meeting were read and approved.

The Secretary announced the names of the committee appointed by the president for the recording of purposeful introductions into the Territory, of insects and other invertebrates, as follows:

Mr. O. H. Swezey (Chairman), representing the H.S.P.A. Experiment Station.

Mr. D. T. Fullaway, for the Territorial Board of Agriculture and Forestry.

Mr. A. C. Mason, for Bureau of Entomology, U.S.D.A.

Dr. F. G. Holdaway, for the University of Hawaii, and

Mr. K. Sakimura, for the P.P.C.A. Experiment Station.

PAPER PRESENTED

Mr. E. C. Zimmerman presented a paper entitled "Identification Tables for the Introduced Hawaiian Nitidulidae (Coleoptera)."

Cryptothrips floridensis Watson.—Mr. Swezey exhibited specimens of a large black thrips, and their work on the camphor tree, brought in by Dr. Lyon May 28 from a tree in his yard which was considerably infested by them; also from a tree in the Foster Park, June 1, 1938. The thrips infest the buds, killing some of them, and causing the new leaves to develop in a crippled condition in others. It appears to be an unrecorded species for Hawaii. Specimens were sent to Mr. Dudley Moulton for determination.

Coptotermes formosanus Shiraki.—Mr. Swezey reported a daytime flight of this termite, occurring all during the forenoon of May 7 and again the next forenoon. The termites issued through a ventilator in the concrete wall below a corner window of the entomology laboratory at the Experiment Station, H.S.P.A. Mynahs and sparrows soon were attracted to the place and began feasting on them. Some of the termites were captured in flight, and others picked up from the ground. The common dragonfly (*Pantala flavescens*) also came in for a share, and a few of another dragonfly. There was a similar flight from the same place the previous year.

Anthonomus eugenii Cano.—Specimens of the pepper weevil were exhibited by Mr. Swezey, who had swept them from the weed *Solanum nodiflorum* growing along the C.C.C. trail at Kealia, Oahu, May 30, 1938.

Cryptogonus nigripennis Weise.—Mr. Swezey reported this little ladybeetle being well established at the Coombs' place at Heeia, Oahu, where coconuts, plume palms, and bananas are badly infested with *Pinnaspis buxi* (Bouché). He had visited the place recently with Mr. Chock of the Board of Agriculture, who had colonized the *Cryptogonus* there from material obtained at Hanalei, Kauai, where the coconuts were similarly badly infested and the lady beetle well enough established so that they could be collected by hundreds. *Cryptogonus* was sent up from Guam by Mr. Swezey in Nov. 1936, and during 1937 became well established at Hanalei. It is the ladybeetle which prevents *Aspidiotus destructor* from damaging coconut trees on Guam. Considerable discussion followed.

Pyroderces rileyi (Walsm.).—Mr. Ashley C. Browne made the following notes on this moth. On May 18, 1938, ripe heads of milo maize were collected in the field on the A. J. Campbell property at Mokuleia, heavily infested with larvae of *Pyroderces rileyi.* Adults were reared in the laboratory from the material. Determination was made by Dr. F. X. Williams. This is believed to be the first record of this moth appearing in milo in the Territory, however as early as 1925 it was reported to be destructive to the crops in the Imperial Valley. It has at times been destructive, also on milo, in both New Mexico and Arizona.

Pinnaspis buxi (Bouché) on persimmon.—Mr. Browne reported that on May 6th, 1938, persimmon leaves heavily infested with *Pin-*

naspis buxi were received from Hilo, Hawaii. From the scale, *Aspidiotiphagus citrinus* was collected, which was later determined by Mr. Fullaway. It is thought that this constitutes the first Territorial record of this scale appearing on persimmon.

Lobodiplosis pseudococci Felt.—Dr. C. Schmidt stated that this cecidomyid is well established on Molokai, Lanai, and Oahu, its larvae preying on the pineapple mealybug.

Achatina fulica (Fer.).—On behalf of Mr. C. E. Pemberton, F. X. Williams exhibited specimens of the eggs and other stages of the Giant African snail, *Achatina fulica* (Fer.), which was found under culture in the homes of a number of Japanese in Honolulu during April, 1938, and in one home on the island of Maui. To date, two separate importations of living snails, totaling 10 adults, are known to have been brought into Hawaii from Japan. Both importations were made in November, 1936, according to information supplied by L. A. Whitney. The importations were made illegally and without the knowledge of the Plant Inspection officers. At the present time (June 2, 1938) the snail has been found established in the open at several places on Maui. It is a serious pest of many garden vegetables and other plants in India, Ceylon, Malaya, Java, and Borneo, where it has been introduced. All colonies found under culture in homes have been confiscated and destroyed, but present evidence of its establishment in the field on Maui greatly increases the probability that it will become permanently established in the Islands.

Mr. K. Sakimura presented a note as follows: Information on *Achatina fulica* in Japan was recently received. The Japanese government discovered several cases of breeding and selling of this giant snail in 1936 spring, and immediately prohibited its further introduction into Japan and also Formosa. Now it is known no case of breeding or selling has been reported.

Anastatus sp.—Two specimens were exhibited by Mr. Swezey of a large banded-winged eupelmid apparently of this genus, which Mr. Ehrhorn had found ovipositing in a cluster of *Holochlora japonica* eggs in his garden, May 12.

Mr. O. H. Swezey mentioned the death on March 31, 1938, of Dr. E. Meyrick, celebrated British lepidopterist.

Mr. D. T. Fullaway mentioned the recent death of the Mr. J. E. A. Lewis, coleopterist, long a resident of Japan.

JULY 7, 1938

The 391st monthly meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, Honolulu, Thursday, July 7, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Ethel Lucas, Miss Amy Suehiro, Messrs. Bianchi, Bryan, Donaghho, Ehrhorn, Fullaway, Holdaway, Mc-

Bride, Pemberton, Sakimura, Schmidt, Swezey, Van Zwaluwenburg, and Williams.

Visitor: Mabel Chong.

The minutes of the preceding meeting were read and approved.

PAPERS PRESENTED

On behalf of Messrs. Carl J. Drake and D. M. Frick (Ames, Iowa), Dr. F. X. Williams presented a paper entitled: "Synonomy and Distribution of the Lantana Lace Bug (Hemiptera: Tingitidae)." Mr. O. H. Swezey presented a paper entitled: "Notes on Oedemeridae in Hawaii and Palmyra."

NOTES AND EXHIBITIONS

Clytus (*Clytanthus*) *pilosus* var. *glabromaculatus* (Goeze).—Mr. F. A. Bianchi submitted the following notes: *Clytus* (*Clytanthus*) *pilosus* Först. var. *glabromaculatus* (Goeze). Three specimens of this beetle are exhibited. They emerged in Honolulu from chestnut-wood fencing imported from France about two months ago by Mr. William Weinrich. Represented in France almost exclusively by the present variety, *Clytus pilosus* has also been reported from Spain, Belgium, and North Africa. Its hosts are many, including chestnut, fig, prune, apple, oak, grape vine, and pear; but the larva, to judge from literature at hand, bores only into dead trees or those already nearly killed by other primary pests. As the beetle is able to oviposit on stripped logs as well as on the bark of trees, it might conceivably infest milled lumber at times, but the fact is not reported.

Aleurodothrips fasciapennis Franklin.—Mr. Bianchi reported that a good many of these thrips, mostly females, were collected during the month of May on the leaves of a large specimen of *Ficus bengalensis* which stands in Kapiolani Park. Later visits, during June and July, show the thrips to have become very scarce. This predacious species was first reported as an inhabitant of Hawaii in August, 1929. One single specimen was intercepted at that time on a shipment of coconuts made from here. Since then the species has been found on Oahu and Molokai on *Emilia* and pineapple plants, but is is apparently uncommon. It is interesting, therefore, to record its abundance on a hitherto unreported host.

Neoclytarlus chenopodii Perkins.—Mr. Swezey exhibited a specimen of this longicorn beetle and a portion of the stem of *Chenopodium oahuensis* from which it had issued. This stem contained 130 exit holes from which beetles had issued. It was obtained June 18, 1938, in the same region near Puu Palikea where Dr. Williams first discovered this beetle in November, 1936.

Geocoris puncticeps (Say).—Mr. Swezey exhibited a specimen of this bug which matured from a nymph swept from the Australian saltbush on the flats west of Makapuu Head, June 22, 1938. Sev-

eral nymphs were secured. They were robust, whitish with black markings. In vial they fed on aphis on hibiscus bud, but finally all died without maturing, except one only.

Gonatocerus sp.—Mr. Swezey exhibited a slide mount of a species of this genus of mymarids, which had not previously been recorded in Hawaii. He had obtained the single specimen, June 23, 1938, found crawling on his hand while sitting in an auto in front of the Post Office in Honolulu. He had looked up in literature about 30 different species of *Gonatocerus,* but could find none with which his specimen agreed.

Tarsonemus latus Banks.—Mr. Swezey reported the broad mite as having recently severely infested three kinds of plants in his garden: marigold, *Tithonia speciosa* and *Datura fastuosa.* At a previous time dahlia was similarly affected. The young terminal portions of the plants had a much crippled growth, the leaves being much crinkled and distorted and somewhat thickened. The mites and their eggs were mostly found on the very youngest foliage. The eggs are distinguished by having rows of white spots on the surface.

Nysius coenosulus Stal.—Mr. Swezey exhibited a vial with 899 of this bug, or a close related species, which were captured with a few sweeps of the net on a low lehua ohia bush on Puu Palikea, Waianae Mts., June 18, 1938. More were captured in the net at the time, but probably half of them escaped while getting the others into a collecting bottle. They were all adults and had no doubt migrated from the lowlands where they had bred on weeds.

Cerambycobius cushmani Crawf.—Mr. Swezey exhibited this eupelmid which he had reared from *Bruchus sallaei* in pods of *Acacia farnesiana* collected near Waianae, Oahu, July 3, 1938. This indicates the widespread establishment of this parasite, as he had previously similarly reared it from Makapuu, the opposite side of the island. Other parasites reared from the same host from Waianae were: *Horismenus* sp., *Lariophagus texanus* Crawf., *Urosigalphus bruchi* Crawford, *Glyptocolastes bruchivorus* Crawf. The *Horismenus* were by far the most abundant. This *Horismenus* seems to be yet undescribed.

Zoratypus swezeyi Caudell.—A mounted specimen of this rare insect was exhibited by Mr. Swezey who had collected 7 of them in an hour's digging in a rotten koa log in Haleauau Valley, Waianae Mts., Oahu, at an elevation of 2500 ft., July 4, 1938.

Ladybeetles on mountain top.—Mr. Swezey reported 5 kinds of ladybeetles found on Puu Palikea, June 18, 1938: *Coelophora inaequalis* (Fab.), *Lindorus lophanthae* (Blaisd.), *Scymnus blucernarius* (Muls.), *Curinus coeruleus* (Muls.), and *Serangium maculigerum* Blkb. These had no doubt migrated from the lowlands.

Odonata at Kawaihapai.—Dr. F. X. Williams submitted the following note: May 30, Kawaihapai, Waialua Plantation Reservoir.

With Mr. O. H. Swezey. This reservoir recently filled high so that the grass and weeds inundated are still in healthy condition. The immigrant *Enallagma civile* in large numbers, the pretty blue males evidently predominating. But some in tandem, seeking to oviposit on stems. *Anax junius* present as adults though sparse, and one *Tramea lacerata* dipping eggs in green algal floats. I gathered a lot of more-or-less immersed grass and *Commelina* and some algae. In the laboratory the material is swarming with a fairly large long-oval ostracod crustacean. Some protozoa. No chironomids seen. *Ischnura posita* quite rare at this reservoir more to be seen along more-or-less shaded nearby paths and brush. This immersed herbage yielded no damselfly eggs or young.

Opius tryoni Cam.—On behalf of Mr. Q. Chock, Mr. D. T. Fullaway spoke of the rearing of a number of this Mediterranean fruit-fly parasite from the lantana gall-fly.

Opius humilis Silv.—Mr. O. C. McBride stated that this Mediterranean fruit-fly parasite seemed to be approaching extinction. A discussion followed.

Conoderus exsul (Sharp).—Mr. R. H. Van Zwaluwenburg stated that in the last number of the Pan-Pacific Entomologist is a record of the occurrence of *Conoderus exsul* (Elateridae) in California.

Mr. C. E. Pemberton said that the giant African snail *Achatina fulica* was found in the possession of two men on Lanai. The snails were destroyed.

Mr. Pemberton also exhibited a specimen of *Buprestis aurulenta* secured from Mr. Frank Atherton's greenhouse where it had probably emerged from fresh California timber used in reconstructing part of said greenhouse.

Caroline and Marshall Island insects.—Mr. Ehrhorn exhibited a miscellaneous collection of insects, spiders, centipedes, etc., sent to him by the Rev. Clarence I. McCall, of Kusaie Island, for identification and advice regarding their damage and cure on the lands under his control. Mr. Swezey had assisted in the identifications. The specimens are deposited in the H.S.P.A. collection.

Ants collected at Kusaie, 1937:

Odontomachus haematoda (L.).
Monomorium pharaonis (L.).
Anoplolepis longipes (Jer.) ♀.
Plagiolepis sp.
Camponotus maculatus (Fab.).
Camponotus irritans chloroticus (Emery).
Camponotus sp.
Cremastogaster sp. ♀ and ♂.

Other insects collected at Kusaie, March 10, 1937:

Ex pineapple—*Drosophila immigrans* Sturt.
1 large spider.
2 small centipedes.

1 dealated termite.
3 black tenebrionids.
1 small tenebrionid.
1 scolytid.

Insects from Kusaie, Jan., 1938:

2 Derbids.
1 *Ananca decolor* (Fairm.).
1 *Dactylosternum abdominale* (Fab.).
1 *Cucujid—Inopeplus* sp.
2 Scolytids.

Insects from Jabwar, Jaluit, Marshall Is., April 27, 1938:

6 *Isometrus maculatus* De G.
5 *Scolopendra subspinipes* Leach.
2 *Oxidus gracilis* Koch.
3 *Trigoniulus lumbricinus* Gerst.
8 pill bugs.
1 sowbug.
4 spiders.
1 Noctuid caterpillar.
1 Noctuid pupa.
1 Derbid.
3 cockroaches, *Pycnoscelus surinamensis* (L.).
3 *Chelisoches morio* (Fab.).
1 *Anisolabis eteronoma* Borelli.
31 *Odontomachus haematoda* (Linn.).
1 *Paratrechina longicornis* (Latr.).
1 *Typhlops braminus*. Soil snake.

Mr. E. H. Bryan spoke of Mr. and Mrs. R. G. Wind, who passed through Honolulu recently enroute to the New Guinea region. Mr. Wind, an experienced entomologist and collector, hopes to be in the field about 2 years.

Mr. Bryan exhibited Manual of Myiology, Part VI, by C. H. T. Townsend. Sao Paulo, 1938. Diagnoses of genera in Stephanomatini, Cuterebridae, Hypodermatidae, Melanophoridae.

Mr. O. H. Swezey read an obituary notice from the Entomological Record, of Dr. Edward Meyrick, famous English entomologist.

AUGUST 4, 1938

The 392nd meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, Thursday, August 4, 1938, at 2:30 p.m.

Members present: Miss Ethel Lucas, Messrs. Carter, Ehrhorn, Fullaway, Holdaway, Illingworth, Ito, Keck, Marlowe, McBride, Pemberton, Rosa, Sakimura, Swezey, Van Zwaluwenburg, and Williams.

Visitor: F. J. Gay.

In the absence of the president and the vice-president of the Society, Mr. O. H. Swezey was appointed presiding officer for the meeting.

The minutes of the preceding meeting were read and approved.

The Secretary stated that at a meeting of the Executive Committee approved Aug. 4, 1938, the Star-Bulletin bill for $980.14 for printing 500 copies of Vol. X, No. 1, 1938, of the Proceedings of the Hawaiian Entomological Society.

Mr. Swezey, as chairman of the committee recently appointed to record purposeful introductions into the Territory, of insects and other invertebrates, read the introduction to his portion of the work and suggested that all reports be finished before the end of 1938.

He then called on Dr. Carter for a report of his recent trip and studies, for the pineapple experiment station. Dr. Carter responded with a very interesting talk.

Dr. F. G. Holdaway introduced Mr. F. J. Gay, Entomologist from Australia. Mr. Gay spoke of his work in Australia.

NOTES AND EXHIBITIONS

Aphis avenae (Fab.).—Mr. C. E. Pemberton exhibited specimens of this aphis which had been collected by J. P. Martin from roots of sugar cane growing in water cultures in a greenhouse at the H.S.P.A. Experiment Station during July, 1938. The identification was made by D. T. Fullaway and S. H. Au. This is the first host record for the species in Hawaii. It has been taken in Hawaii on only one previous occasion, when P. H. Timberlake caught a single winged specimen while on a street-car near Moiliili, Honolulu, on March 24, 1924, and determined the specimen as *Yamataphis oryzae* Mats.; a name since synonymized with *Aphis avenae* (Fab.). In the present instance the insects were massed in large numbers on the roots of the cane adjacent to and just above the water level in the water culture. This is evidently not a normal habitat for the species in Hawaii. It has never been previously recorded on sugar cane roots. It is a pest on rice roots in Japan and is listed as a grain aphis in various parts of the world.

**Anastatus* sp.—Mr. Swezey exhibited specimens of the same large *Anastatus* that was exhibited at the June meeting, having been found ovipositing in a cluster of *Holochlora japonica* eggs, May 12, by Mr. Ehrhorn. From these eggs, 14 female *Anastatus* issued between July 20 and August 1, 8 of them all appeared on the same day, July 27. This makes the life cycle from egg to adult average about 10 or 11 weeks. Only one *Holochlora* hatched from the egg cluster. It was supplied with fresh hibiscus blossoms from day to day on which it fed and grew very well for over two months, finally dying on July 26 when about one-third grown. The adults are

* Specimens were later submitted to Mr. A. B. Gahan, U. S. Bureau of Entomology, who pronounced it an undoubtedly new species of *Zaischnopsis*, a genus related to *Anastatus*.

commonly known to feed on canna and other blossoms. This new generation of *Anastatus* readily began ovipositing when supplied with a fresh *Holochlora* egg cluster.

Oligomerus obtusus Lec.—Mr. Swezey reported further on this anobiid beetle reared from oak flooring brought in June 7, 1933 (See Proc. Haw. Ent. Soc., VIII, p. 381, 1934). Pieces of infested oak flooring from the residence of John Waterhouse were held under observation since being brought in by Mr. Ehrhorn, June 7, 1393. Beetles had issued from time to time, but observations were interrupted for long intervals and the exact dates of issue are uncertain. The first two beetles issued prior to Aug 5, 1933. 7 *Sclerodermus* issued Jan. 9, 1934, and 3 more on Jan. 11. (Mr. Ehrhorn had secured 6 *Sclerodermus* from the material before it was brought in to our laboratory.) On July 16, 1935, 6 living larvae were found on examining some of the fragments of wood. Three beetles issued prior to Feb. 13, 1937 (fragments of the dead beetles were found). Two beetles issued prior to July 26, 1938 (one whole beetle and fragments of the other found). On examining a piece of the flooring July 27, 1938, a well-grown larva was found in good condition. Material saved for further developments.

Mr. C. E. Pemberton exhibited recently hatched eggs of the immigrant garden snail (*Eulota similaris*). The eggs were dug up in a cane field at Waialua, Oahu, and much resembled those of an earwig, for which they had been mistaken.

SEPTEMBER 1, 1938

The 393rd meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, Thursday, September 1, 1938, at 2:30 p.m.

Members present: Miss Ethel Lucas, Miss Amy Suehiro, Messrs. Browne, Bryan, Fullaway, Holdaway, Illingworth, Mason, Rosa, Schmidt, and Van Zwaluwenburg.

Visitor: P. I. Fagan, Jr.

In the absence of Dr. Williams, the chair asked Mr. Van Zwaluwenburg to act as secretary.

The minutes of the previous meeting were read and approved.

PAPERS PRESENTED

On behalf of Mr. R. L. Usinger the following paper was presented, "A New Genus of Pacific Island Enicocephalidae, with New Species from the Hawaiian and Philippine Islands."

A paper by Mr. P. H. Timberlake was presented by title, "A New Species of Hippodamia from Mt. Rainier." (*H. washingtoni* n. sp.)

NOTES AND EXHIBITIONS

Pseudoscorpions.—Mr. Browne exhibited specimens of a pseudoscorpion collected in numbers in rice in a warehouse at Hanalei, Kauai. They were determined by Mr. E. H. Bryan, Jr., as *Lophochernes cryptus* Chamberlin. Previously considered to be *Chelifer bifissus* Simon, a Sumatran species, it was first named by J. C. Chamberlin in "Check List of the False Scorpions of Oceania" (Bishop Museum Occasional Papers, x, no. 22, p. 11, 1934). Mr. Bryan called attention to Chamberlin's paper, "Arachnid Order, Chelonethida" (Stanford University Publication, Biological Sciences, vii, no. 1, 284 pp., 1931).

Thysanus dactylopii Timb.—Dr. Schmidt reported the emergence of this hyperparasite of mealybugs from mummies of *Pseudococcus brevipes* Ckll. which were parasitized by *Anagyrus coccidivorus* Dozier.

Eupristina verticillata Waterts.—On behalf of Mr. O. H. Swezey Dr. Williams reported that on August 5, Mr. Swezey first found the agaonid wasp, *Eupristina verticillata,* pollinator of *Ficus retusa,* the Chinese banyan, established on a large and a small tree on the Punahou campus, Honolulu. Figs containing these wasps had been sent (February–May, 1938) by Mr. D. T. Fullaway from the Philippines and Hongkong. The *Eupristina* issuing from these introductions had been liberated on trees in several parts of the city, including Punahou, Thomas Square and the intersection of King and S. Beretania Streets. On Aug. 30 Dr. Williams found these wasps also established at Thomas Square and at King and S. Beretania Sts.

Cryptothrips floridensis Watson.—Mr. Fullaway asked if the presence of the camphor thrips in Hawaii had been recorded in the Proceedings. Specimens were first collected by Dr. H. L. Lyon, who found them on camphor leaves in Honolulu, in May, 1938. Identification of the material was made by Mr. John Steinweden.

Mr. Bryan gave an interesting account of a recent trip to the Pacific equatorial islands and American Samoa, illustrating it with numerous photographs.

Mr. Arthur C. Mason, recently returned from the mainland mentioned seeing large-scale outbreaks of *Popillia* in New Jersey and of grasshoppers in the middle west, and described an outbreak of Mormon crickets seen in Nevada.

OCTOBER 6, 1938

The 394th meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, October 6, 1938, at 2:30 p.m.

Members present: Messrs. Au, Bianchi, Fullaway, Holdaway, Mason, McPhail, Rosa, Schmidt, Van Zwaluwenburg, and Zimmerman.

Visitors: Miss Margaret Poor; Messrs. M. Matsuura, A. T. Wong, Y. Tanada, and T. Yoshida.

The minutes of the previous meeting were read and approved.

The acting secretary presented a letter from the Zoological Society of London, appealing for a donation toward the support of the Zoological Record. It was moved, seconded and voted that the sum of $25 be sent the Zoological Society.

A letter was read from the Secretary of the Hawaiian Sugar Planters' Association announcing the payment by the Planters' Association of the $980.14 bill for the last issue of the Proceedings. It was moved by Mr. Zimmerman, seconded and passed, that the thanks of the Society be expressed to the H.S.P.A. for its generous contribution.

Miss Margaret E. Poor, recently appointed assistant entomologist at the Bishop Museum, was introduced, and nominated for membership by Mr. Zimmerman.

PAPER PRESENTED

Miss Poor presented a paper by Dr. C. J. Drake and herself entitled "Some Tingitidae (Hemiptera) from the Eastern Hemisphere."

NOTES AND EXHIBITIONS

Eupristina verticillata Watertst.—A note from Dr. F. X. Williams reported finding, on October 2, 1938, *Eupristina verticillata* in figs of a small Chinese banyan (*Ficus retusa*) on Pauoa Flats behind Honolulu. The recent kona weather may have aided this wasp in its ascent of nearly 2,000 feet and its progress inland of more than a mile.

Anchastus.—Mr. Van Zwaluwenburg mentioned that a comparison of larval material of the local *Anchastus swezeyi* and *Anchastus sericans* Cand. from Arizona, shows definitely that the local elaterid is not congeneric with the mainland *Anchastus*. Entirely satisfactory adult generic separating characters between the two have yet to be found.

Mr. Zimmerman gave an interesting account of his recent three-months collecting trip to the Fiji archipelago; he reported that the summer season yields a totally different entomological catch than does work during the winter months.

NOVEMBER 3, 1938

The 395th meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, November 3, 1938, at 2:30 p.m. President Schmidt in the chair.

Members present: Miss Margaret Poor, Messrs. Bianchi, Browne, Bryan, Carter, Ehrhorn, Holdaway, Illingworth, Keck,

Rosa, Sakimura, Schmidt, Van Zwaluwenburg, Weinrich, Williams, and Zimmerman.

Visitors: Minoru Matsuura, Y. Tanada, and Toyoki Yoshida.

The minutes of the previous meeting were read and approved.

Miss Margaret E. Poor was elected to regular membership in the Society.

The Secretary stated that $25.00 had been sent to the Zoological Society of London, to help publish the Zoological Record.

PAPERS PRESENTED

On behalf of Abbe Parent in France, Dr. F. X. Williams presented a paper describing Hawaiian Dolichopodidae.

Mr. E. C. Zimmerman presented a paper entitled "A New Fijian Diathetes Injurious to Pandanus." He also exhibited a fine wash drawing by Miss Poor.

NOTES AND EXHIBITIONS

Dr. Walter Carter exhibited an undetermined fly reared from decayed iris from Kauai.

Mr. Bryan exhibited a Bishop Museum Occasional Paper (XIV, No. 11) in which H. de Souza Lopes describes as *Goniophyto bryani* the Sarcophagid fly which was found so abundantly on the N. W. Hawaiian islands by the Tanager Expedition in 1923.

Mr. Ashley C. Browne stated that tomato plants growing at Puuloa, Oahu, were found on Oct. 30, 1938, to be heavily infested with the mealybug *Ripersia palmarum* Ehrh. The attack was chiefly confined to the roots and was severe enough to have killed approximately one-half the vines in a commercial planting.

Mr. F. A. Bianchi said that the fly *Agromyza simplex* on asparagus was very local at Waialua, Oahu. He also spoke of a small lepidopterous caterpillar that mined the tips of asparagus branches and pupated in its tunnel. The moth was not determined.

Dr. Walter Carter exhibited two specimens of a giant mealybug collected on a tree at Amani, East Africa. It was determined by Mr. E. M. Ehrhorn as *Lophococcus maximus* Ckll.

Mr. E. M. Ehrhorn was then called upon and gave a brief account of his recent trip to the mainland of the United States, stressing his visit among entomologists at Washington, D. C.

DECEMBER 1, 1938

The 396th meeting of the Hawaiian Entomological Society was held at the H.S.P.A. Experiment Station, Dec. 1, 1938, at 2: 30 p.m.

Members present: Miss Margaret Poor, Messrs. Bianchi, Bryan, Carter, Ehrhorn, Fullaway, Holdaway, Ito, Illingworth, Keck, Rosa, Sakimura, Schmidt, Van Zwaluwenburg, Williams and Zimmerman.

The minutes of the previous meeting were read and approved.

The Secretary-Treasurer read the financial report for the Society for 1938. It was moved and seconded that this report be accepted, subject to examination by an auditor. The president appointed Mr. E. M. Ehrhorn as auditor.

Mr. K. Sakimura presented the report on the purposeful introductions into the Territory, of beneficial insects and other invertebrates, made by the Pineapple Producers' Experiment Station since 1930.

ELECTION OF OFFICERS FOR 1939

President	Fred. A. Bianchi
Vice-President	R. H. Marlowe
Secretary-Treasurer	F. X. Williams
Additional Members of Executive Committee	W. Weinrich E. C. Zimmerman

The matter of increasing the price of the Proceedings of the Hawaiian Entomological Society, from $0.75 per number to considerably more, was brought up for consideration. The president left this matter to the executive committee for future recommendations.

PRESIDENTIAL ADDRESS AT ANNUAL MEETING

The retiring president, Dr. C. Schmidt, delivered his annual address on "Musings of an Armchair Philosopher." This interesting paper brought forth considerable and animated discussion.

PAPERS PRESENTED

Mr. E. C. Zimmerman presented two papers entitled as follows: "Proterhinus of Hawaii (Coleoptera: Aglycyderidae)," and "Cis of Maui and Lanai (Coleoptera: Ciidae)." Mr. K. Sakimura presented a paper "On the Host Plants of Some Hawaiian Thrips" (by title only). Dr. F. X. Williams presented a paper on "Biological Studies in Hawaiian Water-Loving Insects, Part III; Diptera or Flies, B. Asteiidae, Syrphidae and Dolichopodidae." Mr. R. H. Marlowe presented a paper entitled: "Note on *Ananca bicolor*."

On behalf of Mr. R. L. Usinger, Mr. D. T. Fullaway presented a paper entitled: "Distribution and Host Relationships of Cyrtorhinus (Hemiptera, Miridae)."

Mr. D. T. Fullaway presented a paper entitled: "New Species of Proctotrupid Wasps from Bishop Museum Collection of Samoan and Fijian Insects."

NOTES AND EXHIBITIONS

Isoneurothrips australis Bagnall.—Mr. Bianchi reported finding this thrips on the flowers of *Eucalyptus robusta* in the Honouliuli Forest Reserve. No eggs were seen, but both sexes, young and

adults of the insect were exceedingly abundant among the numerous stamens of the flowers. This constitutes a new record for the Territory. Mr. Bianchi's observations lead him to think that in *Eucalyptus robusta* this thrips feeds on the abundant exudation which ordinarily covers the inside walls of the calyx cups, and is not, therefore, visibly injurious to the host plant. The small brown areas on the stamens and calyx cups which in Australia have been recorded as injuries caused by the thrips' feeding, appear under the microscope to be due to a fungus that is to be found widely spread among the *Eucalyptus robusta* trees of Honouliuli. Mr. Bianchi plans further research on this matter.

With three as yet undescribed species reported by Mr. Sakimura (Proc. Haw. Ent. Soc. Vol. X, No. 1, p. 167), this makes the tenth species of Isoneurothrips known from Hawaii and the eighteenth from the world. It is the type species of the genus Isoneurothrips Bagnall, and has been found in South and West Australia, Tasmania and Victoria. In its original habitat it is most abundant on varieties of Eucalyptus with fleshy stamens but the larvae, at least, are also found on the flowers of plum, apricot, peach, and pear.

Dr. C. Schmidt transmitted a rapid technique for whole mounts of small invertebrates—as follows: "Dioxane" for 15–20 minutes for dehydrating and clearing, and then mount in "Diaphane" for a permanent mount.

Mr. D. T. Fullaway reported that he recently found the buprestid beetle *Agrilus extraneus* Fisher working in unhealthy or perhaps dead monkey pod (*Samanea saman*) branches.

Mr. Fullaway also stated that Dr. Mason, Government Entomologist at Washington, D. C., was of the opinion that our common taro aphis was *Rhopalosiphum nymphae* (Linn.). It has hitherto been considered as *Aphis gossypii* Glover.

Dr. Walter Carter spoke of the use of "meta," a German dry alcohol preparation, against the Giant African Snail *Achatina*. It is mixed with bran, at the rate of ½ oz. of meta to each pound of bran. It is broadcast or made into heaps. Refs.: Jnl. Rubber Inst. Malaya, Vol. 8, Jan. 1938; Tea Quarterly, Vol. XI, part II, June 1938.

Synonomy and Distribution of the Lantana Lace Bug (Hemiptera: Tingitidae)

BY CARL J. DRAKE AND D. M. FRICK
Ames, Iowa, U. S. A.

(Presented by Dr. F. X. Williams at the meeting of July 7, 1938)

The lantana lace bug *Teleonemia scrupulosa* Stål (fig. 1) is autochthonous to the tropical and neotropical regions of the Americas, and was originally described by Carlos Stål (1873) from specimens collected at Rio Janeiro, Brazil. Since then the species has been recorded from numerous localities in Brazil, Peru, British and French Guiana, Colombia, Venezuela, Central America, West Indies, Mexico and southern United States (Florida and Texas). Specimens from all these regions (including one of Stål's cotypes from Brazil) have been examined by the authors, and its distribution in the western hemisphere seems to coincide rather closely with that of its verbenaceous host-plant genus *Lantana*.

In the course of studying the phytophagous enemies of the *Lantana* species of plants in Mexico (Perkins & Swezey, 1924), Albert Koebele of the Hawaiian Sugar Planters' Association made the first observations on the feeding habits and host-plant relationship of the lantana lace bug. In 1902 he introduced a number of different species of lantana-feeding insects into the Hawaiian Islands for the purpose of checking the ever-increasing spread and occupation in the pastures and lowlands of lantana plants which had been introduced some years previously as ornamental shrubs from Mexico.

Fig. 1. *Teleonemia scrupulosa* Stål. (Drawn by Sid Horn.)

The spread of lantana shrubs in the Islands was greatly aided by two introduced exotic birds, namely, the Chinese turtle dove, *Turtus chinensis* (Scop.), and the Indian mynah, *Acridotheres tristis* (Linn.), which are voracious feeders on the aromatic berries and rapidly disseminated the seeds of lantana in the Islands.

Scrupulosa Stål is one of the most common and widely distributed tingitids in South, Central and Insular America, and Mexico. In the United States it is known only from the southern parts of Texas and Florida. It may be separated from closely allied species by the rather densely and shortly pilose antennae, impressed areolae of discoidal area, and the very finely pubescent pronotum and discoidal and subcostal areas of the elytra. The costal area is moderately wide and uniseriate, the areolae being moderately large, hyaline and nearly uniform in size. The carinae and paranota are foliaceous and also uniseriate.

All food plant records of *scrupulosa* are from *Lantana* species, save two series of specimens from Texas. One long series of nymphs and adults was collected on an undetermined species of the mint family (Labiatae), Houston, Texas, and the other on Poppy Mallow, *Callirhoë involucrata* (T. & G.) (Malvaceae), Victoria, Texas. Some of the specimens collected on mint have a shorter, slightly thicker and somewhat more densely pilose antenna (fig. 1,*a*), whereas others cannot be distinguished from those taken on lantana plants. The same statement also applies to the specimens from Poppy Mallow. As all other characters are very similar to examples from *Lantana,* it seems inadvisable to erect a varietal name for the specimens found breeding on an undetermined species of mint and Poppy Mallow. Most of the specimens of *scrupulosa* from Texas were collected on lantana and the insect does not seem to be able to breed or live very long on plants other than lantana.

In the Fiji Islands and Australia (and nearby islands), the thorny species of lantana (*L. camara*) has spread at an alarming rate and become a weed of considerable importance in low-lying areas. Large numbers of these shrubs growing close together form dense, impenetrable thickets, overrun other vegetation and claim large tracts of valuable land. The dissemination of lantana plants in the Fiji Islands and other foreign countries, as in Hawaii, has been accelerated by birds which eat the berries and carry the seed to new areas. Accounts of the introduction of the lantana lace bug into Fiji and Australia have been published by Simmonds (1928) and Fyfe (1937).

Excellent papers on the biology and ecology of the lantana lace bug have been published by the entomologists of Hawaii, Fiji and Australia. In summing up the work in Australia, Fyfe (1937, p. 186) states: "These studies indicate that if *T. lantanae* [= *scrupulosa* Stål] becomes established and flourishes in this country, it may be expected to reduce seriously the vigour of individual lantana

plants. This should often give competing plants an advantage which would enable them to displace the lantana. On a heavily infested plant, the attack may be severe enough to defoliate it and to kill it directly. As the bugs destroy the flowers and flower buds, they will limit seed production, and, consequently, check the spread of the lantana pest."

The introduction of the lantana tingitid and other lantana-feeding insects into the Hawaiian Islands from Mexico represents the first attempt to control noxious weeds by means of insects, and much credit is due the entomologists of the Hawaiian Sugar Planters' Association for initiating the first project on the biological control of weed pests by means of insects. The high specificity and stability of host-plant relationship of the lantana lace bug have been fully demonstrated by Koebele (Perkins & Swezey, 1924) and others, who introduced and colonized large numbers of this tingitid in distant countries for the suppression of the lantana weed.

Teleonemia scrupulosa Stål (fig. 1)

T. scrupulosa Stål, Hemip. Fabr., I, 1868, p. 92.
T. scrupulosa Stål, Enum. Hemip., III, 1876, p. 132.
T. scrupulosa Champion, Biol. Centr.-Amer., Rhynch., II, 1898, p. 40, pl. iii, figs. 12 & 12a.
T. bifasciata Kirkaldy, Bul. Soc. Ent. France, no. 15, 1905, p. 216.
T. scrupulosa Barber, Brookl. Ins. Sci. Bul. I, 1906, p. 281.
T. lantanae Distant, Ent., XL, 1907, p. 60.
T. lantanae Kirkaldy, Proc. Haw. Ent. Soc., I, 1907, pp. 140, 154; *ibid.*, 1908, pp. 182, 190.
T. scrupulosa Van Duzee, Bul. Buf. Soc. Nat. Sci., VIII, 1907, p. 22.
T. lantanae Kotinsky, Proc. Haw. Ent. Soc., I, 1908, p. 163.
T. scrupulosa Barber, Bul. Amer. Mus. Nat. Hist., XXXIII, 1914, p. 507.
T. scrupulosa Van Duzee, Amer. Mus. Nat. Hist., XXXIII, 1914, p. 22.
T. scrupulosa Van Duzee, Check List Hemip., 1916.
T. scrupulosa Van Duzee, Cat. Hemip., 1917, p. 222.
T. scrupulosa Drake, Ohio J. Sci., XVIII, 1918, p. 329.
T. vanduzeei Drake, Fla. Bug., III, 1919, p. 24.
T. lantanae Smith, Ann. Appl. Biol., VII, 1920, pp. 40–55.
T. lantanae Perkins & Swezey, Haw. Sug. Plant. Assn. Bul., 1924, no. 16.
T. scrupulosa Drake & Bruner, Mem. Soc. Poey, VI, 1924, p. 145.
T. vanduzeei Drake & Bruner, Mem. Soc. Poey, VI, 1924, p. 144.
T. scrupulosa Drake, Psyche, XXXIII, 1926, p. 86.
T. lantanae Simmonds, Agr. Journ., Fiji Is., I, 1928, p. 10, pp. 16–21; *ibid.*, II, 1929, pp. 36–39, 4 figs.
T. lantanae Drake, Brookl. Ent. Soc., XXIV, 1929, p. 35.
T. scrupulosa Drake, Bul. Brookl. Ent. Soc., XXV, 1930, p. 25.
T. scrupulosa Drake, Ann. Ent. Amer., XXIV, 1931, p. 510.
T. scrupulosa Drake & Hambleton, Rev. Ent., Rio Janeiro, IV, 1934, p. 438.
T. lantanae Fyfe, Agr. Journ. Fiji Is., VIII, 1935, pp. 35–36.
T. scrupulosa Drake, Son.-Abdr. "Konowia," XIC, 1935, p. 10.
T. lantanae Sweetman, Biol. Contr. Ins., 1936, pp. 360, 376, 383.
T. scrupulosa Drake & Poor, Mem. Carn. Mus., XI, 1937, p. 304.

Teleonemia scrupulosa haytiensis Drake (fig. 1,*b*)

Teleonemia haytiensis Drake, Ohio J. Sci., XX, 1920, no. 3, p. 53.

Haytiensis Drake is treated here as a variety of *scrupulosa* Stål and may be distinguished from the typical form by the longer third antennal segment. It is known only from the type and two other examples from Hayti.

Some Tingitidae (Hemiptera) from the Eastern Hemisphere

BY C. J. DRAKE AND M. E. POOR

(Presented by Miss M. E. Poor at the meeting of Oct. 6, 1938)

This paper contains the descriptions of two new genera and seven new species, with notes and revisions on a few other species from India, Australia and Africa. The writers are indebted to J. C. M. Gardner, H. Hacker and B. P. Uvarov for the privilege of studying the material. Unless otherwise stated the types are in the Drake Collection.

Phatnoma takasago Takeya

Takeya, Mushi, 6: 32, tab. 3, fig. 1; text fig. 1. 1933.

Three specimens, Noka, Dehra Dun, U. P., India, collected on *Lantana* sp. June 22, 1937, by G. D. Bhasin. This species has been known heretofore only from Formosa.

Monanthia sufflata sp. nov.

Similar to *M. amitina* Horvath in shape, color, and general appearance but separable from it by its smaller size, more strongly inflated paranota and finer reticulations. Head black, shiny, set with five slender, testaceous, appressed spines, the posterior pair much longer than the others. Bucculae contiguous in front, rostral channel widening posteriorly, rostrum extending on mesosternum. Antennae pale testaceous, segments I and II approximately the same size, whitish; segment III slender, slightly more than twice as long as IV, the latter enlarged and darkened at base. Legs testaceous, tips of tarsi dark. Pronotum, except collar and triangular process, covered by the hyaline, testaceously reticulated, bulbose paranota, roundly inflated above and not resting on disc, converging along median carina at anterior half and at apex and slightly separated along intervening space, areolae rather large; disc beneath paranota dark; collar blackish, obtusely produced forward at middle; median carina foliaceous, reticulate, higher than ridge-like, posteriorly divaricating lateral carinae; triangular process light, reticulations brownish, areolae moderately large.

Elytra very similar in form to those of *M. amitina* but hyaline, the reticulations finer, less uniform in size and color, testaceous across middle of discoidal and sutural areas and at widest part of costal area, the rest brownish; discoidal area more roundly widened outward at apex and more highly elevated along outer boundary at widened part, the areolae smaller, two rows at base and four to five at apex.

Length, 1.89 mm.; width, 0.67 mm.

Holotype, female, Dharampur, Dehra Dun, U. P., India, collected on *Lantana* sp. May 2, 1936, by N. C. Chatterjee.

This species is the only member of the genus found in India with paranota inflated above pronotum, converging at middle and not touching disc.

Cromerus hackeri sp. nov.

Small, brown, clothed with short, flattened, golden hairs. Head black, the hind pair of spines short, appressed, brownish. Rostrum dark brown, ex-

tending beyond middle of metasternum. Legs brown to reddish brown, rather short. Antennal segment I short, slightly longer and stouter than II; III a little less than three times as long as IV, the latter black. Pronotum convex, coarsely pitted, tricarinate, the lateral carinae not very distinct and slightly curved inward immediately behind disc; collum slightly raised, truncate in front. Elytra slightly constricted beyond middle, some of the nervelets fuscous; costal area very narrow, uniseriate, the areolae very tiny, a little larger beyond discoidal area; subcostal area biseriate; discoidal area broad, extending beyond middle of elytra, broadest near middle, the outer margin sinuate, with fuscous markings.

Length, 2.85 mm.; width, 0.90 mm.

Holotype, male, allotype, female, and twenty paratypes, Cedar Creek, Australia.

This species is very much smaller than the other four members of the genus and represents the first record of the genus in Australia.

Perissonemia onerosa sp. nov.

Robust, brown, somewhat shiny. Head without spines. Antennae reddish brown, the third segment becoming testaceous apically and the fourth almost black; segment I stouter than and twice as long as II; III very slender, less than twice as long as IV, the latter slightly swollen. Pronotum moderately convex, shiny, sharply tricarinate, the carinae non-reticulate; lateral carinae slightly thinner and less highly elevated, faintly bowed outward on disc, extending from collar to margin of triangular process; median carina more highly elevated on triangular process. Paranota very narrow, linear, slightly wider in front. Collar very distinct, reticulate, slightly more highly elevated behind; calli impressed.

Rostrum reaching a little beyond middle of mesosternum, rostral channel broad. Elytra with costal margin and apex slightly lighter, outer margin finely serrate; costal area uniseriate, the areolae moderately large, quadrate; subcostal area narrow, biseriate; discoidal area reaching slightly beyond middle of elytra, widest near middle, there five areolae deep, the outer margins slightly sinuate; sutural area more widely reticulate behind.

Length, 3.67 mm.; width, 1.40 mm.

Holotype, female, Vellore, Madras, India, 3700 ft., April 30, 1931, collected on unspiked sandal by N. C. Chatterjee.

This species belongs to the subgenus *Ulonemia,* but in general appearance it more closely resembles *P. torquata,* a member of the subgenus *Perissonemia.*

Physatocheila lenis sp. nov.

Moderately large, oblong, dark brown. Head black, the spines atrophied. Antennae moderately long, dark brown, the terminal segment black; segments I and II moderately stout, short; III two and one-half times as long as IV, the latter fusiform, black. Legs dark brown, the tarsi dark. Pronotum moderately convex, coarsely pitted, sharply tricarinate; the lateral carinae parallel; collar distinct, finely areolate, subtruncate in front; paranota rather narrow, resting on the surface of pronotum, triseriate in widest part. Bucculae contiguous in front, projecting considerably beyond apex of head.

Elytra broadest near middle; costal area narrow, mostly uniseriate, biseriate in front, the areolae small; subcostal area broad, quadriseriate; discoidal area impressed, very large, about two-thirds as long as elytra, widest near middle, there about ten areolate deep; sutural area closely reticulated.

Length, 2.73 mm.; width, 1.22 mm.

Holotype, female, and one paratype, female, Chakrata, U. P., India, collected June 3, 1934, by J. C. M. Gardner.

Closely related to *P. chatterjeei* Drake and Poor but distinguishable by its darker color, shorter antennae, narrower costal and broader subcostal areas and less highly elevated carinae.

Diplocysta trilobata sp. nov.

Obovate, brown, rather small. Head black, convex, with five rather short, blunt, testaceous spines. Antennae moderately long, brown; segment I short, stouter than and a little less than twice as long as II; III slender, slightly curved, four times as long as IV, the latter swollen, dark. Rostral channel widening posteriorly, open behind, the laminae testaceous; rostrum extending beyond mesosternum. Legs rather short, brownish, the tips of tarsi dark. Metasternal orifice circular. Hood extremely large, covering entire disc of pronotum, sloping obliquely upward posteriorly, with a large, somewhat globose protuberance on each side above, the nervures considerably infuscate. Carinae visible on triangular process, the lateral ones strongly divaricating posteriorly. Paranota rather broad, triseriate, resting on the dorsal surface of pronotum, testaceous within.

Elytra short, widest near middle; costal area not very wide, vertically reflexed, uniseriate, the areolae moderately large, rectangular; subcostal area very broad, mostly quadriseriate; discoidal area long, broad, extending far beyond middle of elytra, slightly raised at apex, widest near middle, there five to six areolae deep.

Length, 3.15 mm.; width, 1.70 mm.

Holotype, female, Kiata, Victoria, Australia, October 1928, collected by F. E. Wilson.

Differs from *D. bilobata* Horvath in having broader paranota, black head, and hood divided above into three globose lobes. The type seems to be a short-winged specimen. In *D. globuliformis* Hacker the hood is composed of one large, globose lobe.

Cetiocysta gen. nov.

Differs from *Diplocysta* Horvath in having each side of the pronotum completely covered by an enormous, reticulate, rounded protuberance. These two protuberances meet above median carina and thus conceal the disc and most of the collar; apparently these protuberances are not modifications of collar, carinae or paranota, but are attached to the pronotum along the outer margins. Within these enormous structures but not connected with their inner surface are very large, spongy, honeycombed structures (information obtained by dissecting a specimen of *Diplocysta nimia* Drake). Hypocostal ridge uniseriate. Head, antennae, triangular process and elytra very similar to *Diplocysta*. In the latter, the protuberances are continuous with the collar, and the paranota and lateral carinae are distinct.

Genotype, *C. nimia* (Drake). *Diplocysta nubilia* Drake, and *D. opipara* Drake from the Philippines are also here transferred to the new genus *Cetiocysta*.

Tingis consaepta sp. nov.

Elongate ovate, yellowish brown with small brownish areas, the pubescence short and fine. Head black with five short, stout, brownish spines. First segment of antennae stouter and slightly longer than second, the latter obconical. Pronotum brown, moderately convex, distinctly pitted, with three foliaceous carinae, uniseriate, the areolae rather small; lateral carinae parallel in front, slightly constricted on triangular process; hood low, long,

roof-like in shape, scarcely produced forward; paranota strongly reflexed, mostly triseriate, the outer margin rounded, the areolae moderately large; triangular process long and reticulate. Rostral channel widening posteriorly, very wide behind; rostrum brownish testaceous, the tip black, extending on metasternum. Elytra broad, the apices overlapping and jointly rounded behind, the outer margin broadly rounded, the areolae moderately large; costal area broad, triseriate; subcostal area uniseriate; discoidal area broadest near middle, there quadriseriate, the outer margin slightly sinuate; sutural area large.

Length, 3.00 mm.; width, 1.49 mm.

Holotype, female, Ayur, North Salem, Madras, India, February 19, 1931, collected by F. R. I. Sandal; allotype, male, same locality, June 20, 1931.

Very different from *T. modosa* Drake, *buddleiae* Drake, and *beesoni* Drake, and readily separated from them by the form and indistinctly hairy nervures. Probably most closely allied to *laciocera* Matsumura, but differs from the figure of that species in having a much narrower hood and differently shaped paranota.

Corythauma gen. nov.

Allied to *Leptopharsa* Stål (=*Leptostyla* Stål) but distinguished by the short carinae and the large globose hood which extends back above the disc of pronotum. Bucculae closed in front. Rostral channel not constricted on metasternum. Paranota moderately reflexed, reticulate; lateral carinae extending from behind center of disc to margin of triangular process; median carina projecting slightly farther forward and terminating at apex of triangular process; hood strongly inflated, broadly rounded in front and reaching almost to vertex of head, with the crest of hood over disc of pronotum. Distinctly reticulate, nervures moderately stout. Elytra divided into usual areas. Orifice distinct. Hypocostal ridge uniseriate.

Type of genus *Corythauma* (*Leptopharsa*) *ayyari* (Drake) (Jour. Bombay Nat. Hist. Soc., 36: 1016, 1933). Two specimens of this species recently received from Dehra Dun, India, were collected on *Lantana* sp. Other specimens at hand were collected on Jasmine.

Hormisdas sidae sp. nov.

Head black, armed with five very long, slender, testaceous spines. Antenniferous tubercles long, nearly straight, pointed, almost black. Antennae slender, pale testaceous; segment I short, brownish, stouter than and almost twice as long as II; III slightly more than twice as long as IV, the latter becoming embrowned toward tip. Bucculae broad, closed in front, finely reticulate, dark fuscous. Rostrum testaceous, dark at tip, extending onto mesosternum. Legs long, slender, pale testaceous, the tips of tarsi dark.

Pronotum brownish black, clothed with pale hairs, tricarinate; carinae foliaceous, uniseriate, the median carina more highly elevated and with larger areolae than the lateral, the latter parallel; paranota testaceous, biseriate, the outer margin nearly straight; collar distinct, reticulate, sharply produced forward at middle; triangular process reticulate, nervures dark fuscous, areolae whitish opaque. Margins of paranota and carinae and boundary nervures of elytra finely serrate. Elytra constricted beyond middle; costal area testaceous, biseriate, some of transverse nervelets along subcostal margin infuscate; subcostal area uniseriate, areolae whitish opaque, the nervelets dark fuscous; discoidal area narrow, dark fuscous, triseriate,

the apex and the outer nervure at middle raised; sutural area more widely reticulate apically, dark fuscous, some of apical areolae with light spots. Length, 2.76 mm.; width, 0.92 mm.

Holotype, male, allotype, female, and four paratypes, Kampala, Uganda, Africa, February 2, 1933, collected from *Sida* sp. by H. Hargreaves. Types in the British Museum.

This species, the first of the genus *Hormisdas* Distant to be recorded from Africa, is quite distinct from its cogeners, differing from all of them by its greater length, its straighter and narrower contours and its darker color.

Alloiothucha Drake

Drake, Philip. Journ. Sci., 32: 58. 1937.

Since the writers published notes on the genus *Holophygdon* Kirkaldy and suppressed *Alloiothucha* as a synonym of this genus (Drake and Poor, Philip. Journ. Sci., 62: 18. 1937), Mr. W. E. China of the British Museum has kindly sent them five specimens of *H. melanesica* Kirkaldy from Fiji, which show these two genera to be very distinct. In the genus *Alloiothucha* the paranota are distinct and the enormous hood structure covers base of head and extends posteriorly to base of triangular process, and is not divided longitudinally. *A. necopinata* Drake, *A. philippinensis* Drake

FIG. 1. *Alloiothucha philippinensis* Drake, holotype.

(holotype figured) and *Holophygdon artocarpi* Horvath are members of this genus.

In the genus *Holophygdon* Kirkaldy the enormous hood structure is divided longitudinally along the median line and is indistinguishable from the paranota. Also the head is exposed and is distinctly tumid antero-dorsally.

New Species of Proctotrupid Wasps from the Bishop Museum Collection of Samoan and Fijian Insects*

BY D. T. FULLAWAY
Board of Agriculture & Forestry

(Presented at the Meeting of Dec. 1, 1938)

SCELIONINAE

Calôteleia savaiiensis n. sp.

Female.—3 mm. long, robust. Head black, thorax and abdomen, antennae and legs also, fuscous brown; wings hyaline, with a faint brownish suffusion. Head and thorax coarsely punctate, the punctuations closer on the latter. Abdomen finely punctate. Thorax and abdomen with a rather dense hairy clothing, head more sparsely hairy. Head a little wider than the thorax, transverse (width more than twice length when viewed from above), face lying in vertical plane but mouth-parts somewhat retracted and under the eyes, which are very large, oval, convex, bare; fronto-vertex a little wider than long, coarsely sculptured, as is also upper part of face, ocelli placed well back on the former, forming an obtuse triangle, the lateral members close to eye margin; cheeks, post-genae and occiput only moderately wide; antennae inserted immediately above the clypeus, the sockets on either side of a projecting ridge, scrobes rather shallow and confluent, with a smooth and polished, shallowly excavated area on either side, 12-jointed, long and slender, reaching to base of abdomen, subclavate apically; scape slender, slightly flattened and curved, reaching top of eye, pedicel slightly obconic, only a third as long as scape, first funicle joint long, nearly twice as long as pedicel, 2nd, 3rd and 4th funicle joints successively shorter, six joints of club twice as thick as funicle joints and individually as wide as long, together as long as last three funicle joints, the ultimate joint pointed; mandibles yellowish, with apical margin fuscous, stout but not broad, apparently tridentate, lying in close proximity to the well-defined clypeus, which is brownish, the apical margin bearing a row of rather long hairs. Pronotum visible from above and produced into a well-defined neck; mesoscutum short, transverse, the apical margin somewhat angulate, disc without furrows; scutellum transverse, apical margin rounded, costate grooves marking all boundaries; post-scutellum a raised, transverse, costate band with two widely separated teeth on apical margin; metathorax deeply eroded in middle to accommodate abdominal horn, the margins of this hollow raised and carinate, sides declivous; mesothoracic pleurae with three smooth, polished areas traversed by costate furrows. Abdomen short ovate, depressed, with well-marked lateral carinae, slender at base where there is a smooth, polished, upturned horn, pointed apically, widest at apex third segment, segments 1, 2, 3 and 4 subequal in length, 5 and 6 shorter, 1st and 2nd tergites striate. Legs long and slender. Wings long but not particularly narrow, hairy on disc, ciliate on margin, marginal vein comparatively short, not as long as the stigmal, which is knobbed at tip, submarginal and postmarginal quite long.

Described from one specimen collected May 23rd, 1924, at Salailua, Savaii, Samoan Islands, by E. H. Bryan, Jr. A second specimen collected at same time and place shows slight differences in lengths of antennal joints and has the ovipositor extruded three-fourths length of abdomen.

* Types of the species here described are in the Bishop Museum, Honolulu.

Caloteleia bryani n. sp.

Female.—4.5 mm. long, fuscous brown, legs and antennae basally yellowish brown; wings hyaline with a brownish suffusion. Head and thorax punctate, the former rather coarsely grooved on fronto-vertex, face and cheeks; abdomen striate both dorsally and ventrally. Head a little wider than thorax, subquadrate, fronto-vertex convex, a little wider than long, face lying in vertical plane, mouth-parts retracted to a position under the eyes, which are only moderately large, broad oval, convex; ocelli placed between the eyes well back on vertex, forming an obtuse triangle with lateral members touching the eyes; antennae inserted close to and above the mouth, the sockets lying on either side of a spatulate, elevated projection of the head, 12-jointed, clavate apically, scape elongate, slender, reaching middle of eye, pedicel short, but a fourth the length of scape, first funicle joint more than twice as long as pedicel, following segments successively shorter to six-jointed club, whose individual segments are considerably wider than funicular segments and generally as long as wide; mandibles lying in the oral cavity, short, stout, apparently tridentate; cheeks and postgenae quite wide. Thorax elongate ovate, fairly wide and deep; prothorax visible from above; mesoscutum smooth and shining with two well-marked furrows which together with the anterior and lateral margins are costate, disc smooth and shining with very sparse punctuation; scutellum absent; metanotum basally a narrow, tranverse band, costate on the margins, behind this declivous with middle area broad, flat, and slightly hollowed for the accommodation of the abdominal horn, this area bounded laterally by carinae; thoracic pleurae coarsely sculptured, with deep grooves generally arranged in striae, margins costate. Abdomen elongate, depressed, acutely margined at sides, twice as long as head and thorax combined, basally with a large horn, which reaches nearly to the apical margin of mesoscutum, apically the abdomen is acutely produced in a cauda or tail, first four segments of about equal length, 5th and 6th shorter and together about the same length as spinous cauda; horn and posterior margins of the first five tergites smooth and shining, the remaining surface finely sculptured, a well-marked groove between tergites 1 and 2, 6th tergite more finely punctate. Wings long and narrow with discal hairs and marginal cilia; marginal vein short, about three times as long as wide, stigmal ending in a knob and postmarginal of about equal length and only a fifth the length of submarginal, which reaches the margin beyond middle of wing. Legs slender, both femora and tibiae somewhat clavate apically.

Described from one specimen collected May 17th, 1924, at Salailua, Savaii, Samoan Islands, in rain-forest 2000–4000 feet elevation, by E. H. Bryan, Jr.

Caloteleia upoluensis n. sp.

Female.—4 mm. long, shining black, the legs fuscous brown; head and thorax smooth, punctate, abdomen coarsely reticulately sculptured on tergites 1, 2, 3 and 4, 5th and 6th tergites and all the sternites punctate, sparsely clothed with hair; wings hyaline with faint brownish suffusion. Head a little wider than the thorax, subquadrate, fronto-vertex convex, a little wider than long, face retracted so that the mouth-parts lie directly under eyes, which are fairly large, broad oval, convex, bare, fronto-vertex, cheeks and postgenae sparsely but conspicuously punctate, ocelli lying between the eyes and forming an obtuse angle, the lateral members touching eye margin, antennae attached close to and above the mouth, the scrobes deeply eroded and separated by a thin carina, the narrow border of the face next the eyes with a double row of punctuations, 12-jointed, moderately long, slender basally, apically clavate, pubescent for the most part, scape only slightly expanded, reaching beyond middle of eye, pedicel about one-

half scape and subequal in length with funicle joints 1 and 2, funicle joints 3 and 4 progressively shorter, six joints of club individually wider than long except ultimate joint, which is longer and blunt pointed, the whole club no longer than the funicle, mandibles short and stout, apparently tridentate, cheeks and post-genae quite wide, the occiput margined. Thorax elongate ovate, fairly wide and deep, prothorax just visible from above, well shouldered at sides; mesoscutum a little longer than wide, with two well-defined grooves, which are punctate, the middle section at base distinctly punctate; scutellum transverse, costate basally, apical margin well rounded; post-scutellum narrow, transverse, with a transverse row of eight pits basally, apical margin carinate; metanotum deeply hollowed in the middle to accommodate the abdominal horn, raised at base and sides, sloping laterally and with acute margin inwardly which at base bears a fascia of hairs; mesopleurae with a wide, shallow groove medially, costate on basal and apical margins; metapleurae striate. Abdomen elongate, depressed longer than thorax and head combined, basally with a large horn, which reaches beyond the middle of the propodeum, apically acutely produced, segments subequal in length and of nearly equal width. Legs slender, only femora swollen. Wings long and narrow, hairy on disc and marginally ciliate, marginal vein about a fifth of submarginal, not quite as long as post-marginal and longer than stigmal, which is knobbed at tip.

Described from seven specimens collected Sept. 16th, 1923, at Tuaefu, Upolu, Samoan Islands, by Messrs. Swezey and Wilder.

Caloteleia nigra n. sp.

Female.—3 mm. long, shining black, mandibles and antennae basally, legs outwardly from coxae ferruginous; wings hyaline, with faint brownish suffusion. Head coarsely sculptured on vertex and cheeks, elsewhere finely punctate and sparsely clothed with hair, a little wider than the thorax, subquadrate, fronto-vertex convex, a little wider than long, face retracted and lying in horizontal plane, mouth-parts situated behind the eyes, which are fairly large, broad oval, convex; ocelli placed between the eyes and marking the angles of an obtuse triangle, lateral members touching the eyes; antennae attached close to and above the mouth, the scrobes lying on either side of a lanceolate projection of the head, 12-jointed, clavate apically, scape elongate, slender, reaching middle length of eye, pedicel only a third length of scape, a little longer than third funicle joint, about same length as 1st and 2nd, following two joints monilliform, club 5-jointed, expanded to twice width of proximal joints, the individual joints wider than long, apical joint button-like; mandibles lying in an oral cavity, apparently tridentate apically, cheeks and post-genae quite wide. Thorax elongate ovate, fairly wide and deep; prothorax visible from above; mesoscutum smooth and shining, with two well-marked furrows, which together with margins are finely costate, disc finely sculptured and punctuate with scattered pinpoint punctuations; scutellum absent; metanotum a transverse, narrow ridge in front, behind declivous, flat and slightly hollowed to accommodate the abdominal horn; thoracic pleurae coarsely sculptured and hairy. Abdomen elongate, depressed, more than twice as long as head and thorax combined, basally with a large horn which reaches nearly to the apical margin of mesonotum, apically acutely produced, first four segments of about equal length, fifth shorter and wider than long, 7th and 8th narrower and subequal in length, surface striae on tergites 1–4, tergites 5 and 6 finely sculptured, horn and posterior and anterior tergal margins smooth and highly polished, the whole sparsely hairy. Wings long and narrow, with discal hairs and marginal cilia, marginal vein short, only three times as long as wide, slightly beyond middle of wing, stigmal vein three to four times as long as marginal and capitate apically, post-marginal vein a little longer than stigmal. Legs slender, both femora and tibiae somewhat clavate apically.

Described from one specimen collected in February 1930 at Amouli, Tutuila, Samoan Islands, by D. T. Fullaway.

Caloteleia swezeyi n. sp.

Female.—4 mm. long. Body variously sculptured but not dull; head entirely black, thorax and abdomen reddish brown, mesonotum and abdomen apically infuscated; antennae reddish brown basally, apical five joints of club black; mandibles and legs yellowish brown; wings hyaline with faint brownish suffusion. Head coarsely sculptured on fronto-vertex, face, cheeks and post-genae smooth and polished, with some pin punctures, a little wider than the thorax, subquadrate, fronto-vertex convex, a little wider than long, face and mouth-parts retracted; eyes fairly large, broad oval and convex, ocelli placed between the eyes and marking the angles of an obtuse triangle, lateral members touching the eyes; antennae attached close to and above the mouth, the sockets on either side of a short, carinate projection, long, reaching to metathorax, 12-jointed, clavate apically, scape elongate, slender, reaching beyond middle of eye, pedicel short, only a fourth the length of scape, three following funicle joints subequal, about half the length of scape, fourth funicle joint shorter, about half the length of first, six joints of club subequal, hardly longer than wide but twice the diameter of the funicle joints; mandibles slender, acute, tridentate apically, cheeks and post-genae fairly wide. Thorax ovate, fairly wide and deep, prothorax visible from above, mesoscutum finely punctate and hairy, with two well-marked furrows, which are costate along with the marginal furrows; scutellum transverse, lenticular in outline, the posterior margin costate; post-scutellum with a projecting lip; metanotum declivous on the sides, hollowed in the middle to accommodate the abdominal horn; thoracic pleurae divided by wide costate furrows, otherwise smooth and shining. Abdomen elongate, depressed, nearly twice as long as combined length of head and thorax, basally with a moderately large horn, apically acutely produced, segments 1 and 2 of equal length, with striae which reach almost to apex of 2nd segment, 3rd segment about two-thirds the length of 2nd, 4th and 5th subequal and individually about half the length of 3rd segment, 6th segment slender and pointed, in length equal to 2nd, all except first finely punctate with pin-point punctuations, and hairy, horn smooth, polished. Wings long and narrow, with discal hairs and marginal cilia, marginal vein apparently longer than the stigmal, which is knobbed at apex, postmarginal vein more than twice the length of the marginal but submarginal longer still. Legs slender, the hind pair very long, twice the length of the front pair, femora and tibiae apically somewhat swollen.

Described from one specimen collected September 25th, 1923, on the Afono Trail, on the island of Tutuila, Samoan Islands, by Messrs. Swezey and Wilder.

Caloteleia wilderi n. sp.

Female.—3 mm. long, smooth and shining, with black head, brown body somewhat infuscated, antennae brown with fuscous club, legs yellowish brown throughout, wings hyaline with faint brownish suffusion. Head polished, subglobose, slightly wider than thorax, fronto-vertex convex, hardly wider than long, face wide and flat, lying in vertical plane, mouth-parts retracted, eyes large, broad oval, convex, bare, ocelli placed between the eyes and marking the angles of an obtuse triangle, lateral members nearly touching the eye, antennae attached close to and above mouth, with a narrow ridge between the sockets, 12-jointed, long (reaching apex of thorax), with clavate club, scape moderately stout, reaching middle of eye, pedicel and first funicle joint subequal in length, their combined length about equal that of scape, 2nd funicle joint nearly as long as the two taken

together and as long as the following two joints, of which the proximal one is twice as long as the distal one, club 6-jointed, all the joints short and about as wide as long, cheeks and post-genae fairly wide, mandibles apparently tridentate. Thorax elongate ovate, fairly wide and deep, prothorax just visible from above, mesoscutum smooth and shining, with polished surface, traversed longitudinally with two well-marked furrows, scutellum semicircular, the rounded apical margin costate, postscutellum a narrow transverse ridge, metanotum declivous, flat and slightly hollowed to accommodate the abdominal horn; pleural costae well-marked. Abdomen elongate, depressed, nearly twice as long as head and thorax together, widest at apex of 3rd segment, slender basally and apically, basally with a large horn, which reaches base of metanotum, apically blunt pointed, first segment four times as long as wide, following segments of nearly equal length, only the first segment striate dorsally beyond the smooth and polished horn; scattered hairy vestiture present. Wings long and narrow, with discal hairs and marginal cilia, marginal vein apparently a little longer than the stigmal, which is knobbed, postmarginal also a trifle longer than stigmal but not quite as long as marginal, submarginal very long, reaching margin near middle of wing. Legs slender, femora and tibiae somewhat clavate apically.

Described from one specimen collected on September 9th, 1923, at Pago Pago, Tutuila, Samoan Islands, by Messrs. Swezey and Wilder.

Caloteleia melanocephala n. sp.

Female.—3 mm. long, generally smooth and shining, with black head, brown body, only the cauda fuscous; wings hyaline. Head polished, subquadrate, slightly wider than the thorax, fronto-vertex convex, about one-half wider than long, face wide, flattish, lying in vertical plane, a row of punctures on lateral margins, mouth-parts somewhat retracted, the oral cavity deeply eroded, the cheeks on either side eroded and striate, the strong, curved, apically broad and quadridentate mandibles prominent, eyes large, broad oval, convex, bare, ocelli placed between the eyes and marking the angles of an obtuse triangle, lateral members touching the eyemargins, antennae attached close to and above the mouth, with a snout-like ridge between the sockets, 12-jointed, long, reaching apex of thorax, slender, with clavate club, scape only a very little expanded, reaching beyond middle of eye, pedicel about one-third scape, 1st funicle joint about one-half, 1st and 2nd subequal, third and fourth progressively a little shorter, the six joints of the club only a little longer than wide on flat side, all together not as long as combined funicle joints, cheeks and postgenae fairly wide. Thorax long oval, fairly wide and deep, prothorax just visible from above, more plainly on sides, mesoscutum smooth, shining, nearly twice as wide as long, with two well-marked furrows, scutellum also transverse with costae on apical margin, the axillae costate, widely separated, their inner angles only reaching to foot of mesoscutellar furrow, metanotum with a ridge-like carinate collar around the depressed and hollowed middle portion, which accommodates the abdominal horn. Abdomen elongate, depressed, nearly twice as long as head and thorax combined, widest at 3rd segment, slenderer basally and apically, with a large basal horn, apically produced in a long, slender cauda with blunt point, 1st and 2nd segments subequal in length and striate from horn to middle of 2nd segment, segments 3, 4 and 5 progressively shorter, 6th or cauda as long as 2nd. Wings long and narrow, with discal hairs and marginal cilia, marginal vein as long as stigmal, which is knobbed apically, postmarginal considerably longer, submarginal longer still, basal vein well marked. Legs slender, femora apically clavate.

Described from five specimens collected March 8th, 1930, at Fagasa, Tutuila, Samoan Islands, by D. T. Fullaway. One speci-

men collected Sept. 20th, 1923, at Pago Pago, Tutuila, Samoan Islands, by Messrs. Swezey and Wilder, and one specimen collected Feb. 19th, 1924, on Leone Road, Tutuila, Samoan Islands, by E. H. Bryan, Jr. appear to be the same species.

Caloteleia vitilevuensis n. sp.

Female.—2.5 mm. long, smooth and shining, all unsculptured surfaces polished. Head black or deeply infuscate on top, brownish beneath, thorax fuscous brown above, lighter beneath, abdomen yellowish brown, antennae fuscous brown, the club darker, legs straw colored, wings hyaline. Head a little wider than the thorax, subquadrate, mouthparts retracted and lying behind the eyes, which are only moderately large, oval, bare, ocelli lying between and forming in outline an obtuse triangle, the lateral members touching the margin of the eyes, fronto-vertex confluent with fairly wide occiput and transverse, wider than long by a half, face vertical, deeply eroded in the middle, between the antennal scrobes, which reach to the eye margin outwardly, inwardly are separated from the central groove by a thin ridge, the upper ends of which are as far apart as the ridge rises above the face and appear from above as setiferous spines, below as two short spines projecting at right angles, mouth opening somewhat eroded above, mandibles short, wide, flat, tridentate apically, the upper edge produced in a long spine, cheeks and postgenae wide, the former more prominent than usual due to shortness and proximity of mandibles, antennae inserted in sockets on side of lower end of ridge just described, at level of lower third of eye, long and slender, 12-jointed, scape slightly expanded, flattened, curved, reaching upper end of eye, pedicel only one-third as long as scape, slightly obconic, 1st funicle joint one and a half times as long as pedicel, about as long as 4th funicle joint, 2nd and 3rd funicle joints a little longer, club 6-jointed but the proximad first joint only slightly thicker than the funicle joints and about as long as the pedicel, the following five joints noticeably thicker and shorter, individually subequal in length and only a little longer than wide, the last pointed. Thorax ovate, moderaely wide and deep, pronotum scarcely visible from above, mesoscutum convex, short, only a little wider than long, traversed by two longitudinal grooves, scutellum convex, transverse, apical margin rounded, postscutellum transverse, flat, costate on basal margin, metanotum declivous at the sides, hollowed in the middle to accommodate the abdominal horn; from the basal ridge or postscutellum there is a linguiform projection overhanging base of horn. Abdomen elongate, longer than head and thorax combined, depressed, carinate at margins, slender basally, widening apically to about three-fourths width of thorax at posterior end of second segment, then narrowing to an acutely pointed apex, first tergite longitudinally striate except on horn, which is smooth and polished, second segment longer than first, the tergite basally with a transverse costate furrow, 3rd, 4th and 5th tergites transverse, subequal in length, which is about a third to a half the width, 6th tergite acutely triangular in shape, a little longer than wide at base and with a hairy vestiture. Wings long, narrow, with discal hairs and marginal cilia, marginal vein short, about three times as long as wide, postmarginal long, reaching nearly to apex of wing, stigmal vein about four times as long as marginal and knobbed apically, submarginal very long, basal vein distinct. Legs long and slender, the femora and tibiae somewhat swollen apically.

Described from one specimen collected June 9th, 1924, at Colo-i-Suva, Viti Levu, Fiji Islands, by E. H. Bryan, Jr.

Macroteleia tutuilana n. sp.

Male.—3 mm. long. Head polished black, only the antennal scape and pedicel and the mandibles brown, flagellar joints fuscous brown to black;

thorax and abdomen including the legs yellowish brown, generally smooth and shining; wings hyaline, with faint brownish suffusion. Head wider than the thorax, subquadrate, fronto-vertex wider than long, convex, merging imperceptibly behind into a rather wide occiput, in front into the face, which is retracted and below the antennae lies in the horizontal plane, that part above the antennae as long as wide, furrowed longitudinally on either side for scrobes, and with a single row of punctures extending along the eye margin, below the antennae widening out considerably and coarsely sculptured with converging striae, cheeks and post-genae also quite wide, eyes fairly large, broad oval, convex, bare, ocelli arranged in form of obtuse triangle, the lateral members touching the eye, antennae attached directly above the short, pointed, medially elevated and carinated clypeus, the sockets lying on either side of a short, thin ridge-like projection, fairly long i.e. reaching to apex of thorax, 12-jointed, scape a little expanded, curved, reaching top of eye, pedicel obconic, about a fifth as long as scape, flagellar joints all much longer, from three to four times as long as wide, the outer five joints a little shorter than the inner five, mandibles short, stout, quadridentate, maxillary palpi apparently 3-jointed, labial palpi 2-jointed. Thorax ovate, fairly wide and deep, pronotum visible from above, mesoscutum transverse, anterior margin semicircular, posterior margin straight, traversed longitudinally by two well marked furrows, scutellum transverse with costate furrows both basally and apically, the disc (as also disc of scutum) smooth, shining, polished, post scutellum a transverse band, rather dull, the basal margin costate, metanotum short, convex above, declivous at sides, the apical margin raised and carinate, the surface sculptured with fine longitudinal striae and dull, the pleurae generally finely rugose and dull, a wide costate furrow directly below the tegulae of front wings separates the smooth and shining disc of the propleurae from the mesopleurae. Abdomen elongate, much longer than head and thorax combined, narrowed at the base, subsessile, pointed at apex (greatest width—about that of thorax—at third segment), depressed, margined and carinate at the sides, the segments of about equal length except the terminal ones, which are shorter, first segment longitudinally striate, following segments finely punctate and hairy. Wings long and narrow, with discal hairs and marginal cilia, marginal vein located on margin beyond middle of wing, about half as long as postmarginal and a little longer than the stigmal, which is capitate apically. Legs long and slender, the femora slightly clavate, coxae stout.

Described from one specimen collected Sept. 9th, 1923, at Pago Pago, Tutuila, Samoan Islands, by Messrs. Swezey and Wilder.

Macroteleia bryani n. sp.

Male.—4 mm. long, black, only antennal scape, mandibles basally and legs golden brown; head and thorax coarsely sculptured, abdomen very finely and clothed with pale hairs arising from minute pin-point punctuations; generally shining, not dull; wings with a yellowish brown pigmentation. Head slightly wider than the thorax, subquadrate, fronto-vertex wider than long; it and the upper face (which widens considerably below middle of eye) coarsely sculptured, lower face smooth, with a line of punctuations along inner margin of eyes, which are fairly large, oval, convex, bare, and have the ocelli lying between them, arranged in the form of an obtuse triangle, lateral members touching margin of eye; cheeks and post-genae wide, the occiput margined; antennae attached above the clypeus, the sockets on either side of a ridge-like projection, 12-jointed, moderately long, slender, filamentous, scape reaching top of eye, a little expanded, pedicel short, less than a third the length of first joint of the flagellum, of which the proximad and distad five joints are subequal in length, the latter a little shorter than the former; mandibles stout, short, wide, apparently tridentate apically,

hinged basally in a socket, behind which the cheek is transversely grooved with six to eight fine striae. Thorax ovate, moderately wide and deep, prothorax visible from above in front, where it is extended into a short neck and also at sides; mesoscutum almost as wide as long, with a central longitudinal carina and two lateral costate furrows; scutellum transverse, basal margin a costate groove, apical margin well rounded; postscutellum a transverse ridge with ten foveae; metanotum basally a transverse, costate ridge or band, apically with an upper triangular flat carinated area, sides sloping downward and coarsely striate, the pleurae smooth, with costate furrows at margins. Abdomen elongate, longer than head and thorax combined, depressed, acutely margined and carinate at sides, slender basally, pointed apically, greatest width at apex of third segment, second segment longest, third next, 1st and 4th subequal in length, 5th and 6th shorter, first tergite and basal three-fourths of 2nd longitudinally striate. Legs long and slender, only the femora expanded. Wings long and moderately wide, with discal hairs and marginal cilia, marginal vein short, about four times as long as wide, not quite as long as stigmal, which is knobbed apically, postmarginal reaching far beyond the stigmal, submarginal even longer, basal vein distinct.

Described from one specimen collected May 17th, 1924, at Salailua, 2000–4000 ft. elevation, Savaii, Samoan Islands, by E. H. Bryan, Jr.

Macroteleia upoluensis n. sp.

Female.—3 mm. long, black, legs, mandibles and antennae fuscous brown, smooth and shining, punctate throughout and sparsely clothed with silvery hairs; wings hyaline, with faint brownish suffusion. Head slightly wider than the thorax, subquadrate, fronto-vertex wider than long, face retracted and lying more in the horizontal than vertical plane, mouth under and behind the eye, antennal scrobes excavated almost to top of eye, smooth and shining, separated by a very fine carina, antennae attached on lower face immediately above the clypeus, 12-jointed, fairly long, filamentous but gradually increasing in thickness apically, the ultimate joint of club twice as thick as first funicle joint, scape slightly expanded, flattened and curved, almost reaching top of eye, pedicel obconic, short, only about one-third the length of scape exclusive of radicle, first and second funicle joints about same length and thickness, following joints thicker and of relatively the same length except the last, which is flattened, larger and pointed, all pubescent; mandibles short, stout, tridentate; cheeks and post-genae fairly wide below the eyes, which are large, oval, convex, bare; ocelli on the vertex forming an obtuse triangle, the lateral members touching eye margin; occiput well excavated. Thorax ovate, moderately wide and deep, pronotum visible from above only at the sides; mesoscutum slightly convex, a little longer than wide, with two longitudinal furrows traversing the disc but not quite reaching apical margin; scutellum transverse, smooth and shining on disc, with costate basal furrow, apical margin semicircular; postscutellum a narrow, transverse ridge, separated from the scutellum by a costate furrow; metanotum with a flat, quadrate disc on top, coarsely reticulately sculptured, declivous at the sides; pleurae smooth and shining, traversed by costate furrows. Abdomen subsessile, elongate, longer than head and thorax combined, depressed, carinate at the sides, 2nd and 3rd segments the longest but others not much shorter, 1st, 2nd and 3rd tergites striate, the striae leaving a narrow smooth transverse strip on apical margin, 2nd and 3rd tergites somewhat reticulately sculptured, 4th, 5th and 6th tergites and the sternites also more finely sculptured. Legs moderately long and slender, only the coxae and femora stout. Wings long and moderately wide, marginal and postmarginal veins longer than the stigmal, which is knobbed at

tip, submarginal vein reaching the costal margin at less than half the length of the wing.

Described from one specimen collected Sept. 15th, 1923, at Apia, Upolu, Samoan Islands, by Swezey and Wilder.

Opisthacantha wilderi n. sp.

Male.—3 mm. long. Head black, thorax and abdomen fuscous brown, antennae fuscous brown, legs yellowish brown; finely and closely punctate, the punctuations on thorax finer than those on head, and those on abdomen still finer. Wings hyaline, with faint suffusion of brown. Head wider than thorax, subquadrate, fronto-vertex a little wider than long, face retracted so that the mouthparts are behind the eyes, facial plane at an angle with the plane of fronto-vertex; antennal scrobes on either side of a median carina smooth and polished, reaching almost to top of eye and to eye margins on sides; antennal sockets on either side of a short ridge-like projection; mouth opening somewhat eroded; mandibles stout, short, wide and tridentate apically; cheeks and post-genae wide and along with the lower part of the face on sides striate behind base of mandibles; occiput margined; eyes moderately large, oval, convex, bare; ocelli placed well forward between the eyes and forming an obtuse triangle, the lateral members touching the eyes; antennae attached immediately above the clypeus, 12-jointed, filamentous, scape a little expanded, flattened and curved, reaching top of eye, pedicel small, only one-half first funicle joint, second funicle joint a little longer than first, which is subequal in length to third and following joints of the flagellum. Thorax ovate, moderately wide and deep, the pronotum visible from above, extended in front into a short neck; mesoscutum about as long as wide, with two longitudinal furrows; scutellum transverse, the hind margin well rounded, both anterior and posterior margins costate; postscutellum a transverse ridge, with a median apical spine; metanotum ridge-like basally, apically hollowed in the middle, declivous at sides, the margins carinate; pleurae smooth and shining, with foveolate margins. Abdomen elongate, depressed, margined and carinate at sides, 2nd and 3rd longest and subequal in length, 1st, which is striate, a little shorter than 4th and a little longer than 5th or 6th, which is blunt pointed apically. Legs long and slender, only the coxae and femora stout. Wings long and narrow, marginal and stigmal vein, which is knobbed at tip, subequal in length and short, postmarginal and submarginal quite long.

Described from four specimens collected at Pago Pago, Tutuila, Samoan Islands, Sept. 9th, 1923, by Messrs. Swezey and Wilder.

Cremastobaeus samoanus n. sp.

Female.—2 mm. long. Head and thorax black, smooth, hardly shining, finely punctate, sparsely clothed in parts with fine, silvery hairs, abdomen brownish black, rather coarsely, longitudinally striate; wings hyaline; mandibles, antennae and front legs fuscous brown, middle and hind legs yellowish brown. Head subquadrate, wider than the thorax, occiput indistinctly margined at the sides, the margin with a costate furrow next it; fronto-vertex a little wider than long, face convex, retracted so that the mouthparts lie beneath the eye, upper margin meeting fronto-vertex at a decided angle and where the median polished groove which represents the antennal scrobes reaches the margin, with a short, sharp ridge, face between the scrobal furrow and eye margin coarsely striate, the striae transverse rather than longitudinal, eyes only fairly large, broad oval, convex, bare, ocelli well forward on the fronto-vertex, arranged in the form of an obtuse triangle, the lateral members of which touch the eye, mandibles short, slender, twisted basally, apically tridentate, cheeks and post-genae fairly

wide, antennae only fairly long, 12-jointed, with expanded 5-jointed club, scape only slightly expanded, not reaching top of eye, about four times as long as pedicel, which is obconic, funicular joints of about equal length, joints of club transverse, all covered with a short pile. Thorax short ovate, fairly wide and deep, prothorax narrowed into a very short neck, pronotum only slightly visible from above in the middle, more so at sides, mesoscutum keystone-shaped, convex, without furrows, scutellum semicircular, convex, axillae widely separated, metanotum declivous apically, a costate furrow separating the pleurae. Abdomen longer than head and thorax combined, narrowed at the base, gradually pointed apically, greatest width at apex of 2nd segment, fusiform, depressed, with carinate margins, the segments subequal in length, second however slightly longer than others. Wings moderately long, with discal hairs and short marginal cilia, postmarginal vein long, three times as long as stigmal, which is longer than the marginal, submarginal longest but reaching the margin of the wing before its middle. Legs moderately long and slender, only coxae and femora a little stouter.

Described from one specimen collected at Pago Pago, Tutuila, Samoan Islands, Sept. 9th, 1923, by Messrs. Swezey and Wilder. A second specimen was collected Sept. 24th, 1923.

Sparasion savaiiensis n. sp.

Male.—4 mm. long, black, scape and pedicel of antennae, legs distally from coxae, base of mandibles yellowish brown, antennae distally from pedicel, coxae and tegulae fuscous brown. Head and thorax coarsely rugoso-punctate, abdomen striate dorsally, finely punctate ventrally. Wings with brownish pigmentation. Head a little wider than the thorax, subquadrate, deeply eroded behind the vertex, fronto-vertex hardly wider than long, sloping anteriorly, face retracted and lying largely in the horizontal plane, convex and widening considerably below the eyes, deeply excavated in the middle (antennal scrobes confluent above, a snout-like prominence below, between the antennal sockets), the mouthparts below and behind the eyes, cheeks and post-genae fairly wide, the latter narrowing posteriorly, antennae fairly long, 12-jointed, filamentous, scape a little expanded, flattened and curved, reaching about middle of eye, pedicel obconic, short, only a third the length of scape exclusive of radicle, flagellar joints generally subequal in length although the first and last are a little longer than the others, mandibles short, stout, curved, bidentate and tending to become pointed apically, eyes fairly large, broadly oval, convex, bare, ocelli on fronto-vertex forming an obtuse triangle, the lateral members touching the eye margin. Thorax long ovate, wide and deep, pronotum visible from above, produced into a short neck where it joins head, mesoscutum as long as wide, convex, anterior margin well rounded, with two grooves extending from apical margin half-way to base where they apparently fade out, scutellum transverse, the disc oval, surrounded by deep costate furrows, postscutellum a narrow, rounded costate band with a small backward projecting ledge medially, metanotum comparatively flat, coarsely reticulately sculptured, extending forward to the mesoscutum on the sides, margin behind produced into a broad, blunt tooth on either side of the median, semicircular incision, pleurae coarsely sculptured except on propleurae behind, the mesopleurae in front and behind with broad, costate furrows. Abdomen elongate, depressed, carinate at sides, 2nd and 3rd segments longest and subequal, 1st and 4th subequal in length but shorter, 5th, 6th and 7th still shorter, tergites coarsely striate to apex of the 5th, the striae leaving a smooth, transverse strip on apical margin of the tergites, ventrites very finely sculptured. Legs long and slender, only coxae and femora stout. Wings long and fairly wide, submarginal vein considerably removed from the costal margin, reaching margin before middle of wing to form a small stigma, from which a short

stigmal vein, knobbed at tip, arises, postmarginal vein very short and pointed.

Described from one specimen collected May 17th, 1924, at Salailua, Savaii, Samoan Islands, in the rain forest at 2000–4000 ft. elevation, by E. H. Bryan, Jr.

Pentacantha wilderi n. sp.

Female.—1.5 mm. long. Body including legs brown and sparsely hairy; head black, mandibles and antennae fuscous brown; smooth and shining, the head polished; wings hyaline. Head a little wider than the thorax, transverse, fronto-vertex wider than long, convex, face as long as wide, lying in the vertical plane and merging with fronto-vertex by a gentle curve, convex, the lower part rather coarsely striate to the cheeks, the striae converging towards mouth opening, cheeks fairly wide, post-genae and occiput a little wider, eyes moderately large, oval, convex, rather sparsely hairy like the fronto-vertex and a part of face, the hairs being short, fine, erect and silvery, ocelli on the vertex arranged in the form of an obtuse triangle, the lateral members nearly as far removed from the eye margin as from median ocellus, antennae inserted in sockets on either side of a short, carinate ridge directly above the clypeus, 12-jointed, moderately long, clavate apically, scape long, reaching beyond top of eye, slightly expanded and flattened, pedicel short, about one-sixth the length of scape, 1st and 2nd funicle joints a little longer, 3rd and 4th monilliform, 6-jointed club about three times as thick as funicle joints, the individual joints transverse, twice as wide as long, mandibles stout, short, tridentate apically. Thorax ovate, fairly wide and deep, pronotum visible from above only at the sides, which converge anteriorly from the tegulae, mesoscutum transverse, one and a fourth times as wide as long, with two longitudinal furrows traversing the convex disc, whose anterior and lateral margins are costate, scutellum short, basal margin a costate furrow, apical margin broadly rounded, postscutellum a transverse band with a median apical lip and two lateral spines, metanotum declivous and hollowed to accommodate the abdominal horn. Abdomen short ovate, depressed, carinate at the sides, third segment the longest and widest, basally narrow and with a short polished horn, apically pointed, a constriction between first and following segments, the first tergite striate, 2nd segment about equal in length to 1st, 4th, 5th and 6th transverse, very short segments. Legs only moderately long and slender. Wings moderately wide and long, with discal hairs and marginal cilia, marginal vein short, about one-sixth submarginal but longer by a third than either postmarginal or stigmal, which is knobbed apically.

Described from one specimen collected Sept. 22nd, 1923, at Pago Pago, Tutuila, Samoan Islands, on Ficus, by Messrs. Swezey and Wilder.

Telenomus upoluensis n. sp.

Female.—2 mm. long, black, head and abdomen shining, thorax dull, legs and antennae basally yellowish brown, antennal flagellum infuscate. Head transverse, sublenticular, wider than thorax, occiput margined, eyes only moderately large, broad oval, convex, bare, ocelli forming a very obtuse triangle between the eyes, lateral members touching the eye margin, fronto-vertex and face confluent, wide, moderately convex, former twice as wide as long, latter widening apically, cheeks and occiput fairly wide, antennae attached close to and above the mouth, the sockets on either side of a narrow projecting ridge, scrobes very much reduced, 11-jointed, clavate apically, scape slender, reaching top of eye, pedicel about one-sixth the length of scape and half the length of first funicle joint, about equal in length to 2nd

funicle joint, 3rd and 4th funicle joints monilliform, 5-jointed club as long as funicle, the individual joints of nearly equal length and almost or quite as wide as long and twice as wide as funicle joints. Thorax subglobose, short, fairly wide and deep, pronotum visible from above only at the sides, mesoscutum convex, finely punctate and hairy, scutellum smooth and shining, posterior margin well rounded and costate, anterior margin marked by a transverse groove, metanotum anteriorly with a transverse, costate ridge, posteriorly declivous, propleurae and mesopleurae deeply grooved, metapleurae with large pit centrally. Abdomen short oval, depressed, margined at sides, 1st and 2nd tergites separated by a groove, striate to middle of the posterior tergite, following tergites indistinctly marked, apex pointed, ovipositor slightly protruding. Wings short, fairly wide, hyaline but glazed, with close set discal hairs and short marginal cilia, marginal and stigmal veins proximad of middle of wing, subequal in length, postmarginal very short. Legs short and moderately stout.

Described from one specimen collected Sept. 16th, 1923, at Tuaefu, Upolu, Samoan Islands, by Messrs. Swezey and Wilder.

PLATYGASTERINAE

Leptacis upoluensis n. sp.

Female.—1 mm. long, polished black, antennal scape and pedicel and the legs brown, flagellar joints of antennae fuscous. Head transverse, occiput straight margined, fronto-vertex and face confluent, convex, the latter about as long as wide, eyes small and on the side of the head, ocelli arranged in the form of an obtuse triangle, the lateral members closer to eye margin than to apical ocellus, antennae attached just above the clypeus, fairly long and more or less filamentous, 10-jointed, the scape nearly as long as the head and slightly expanded, pedicel short, not as long as first funicle joint and obconic, following funicle joints subequal in length and four club joints also somewhat the same, mandibles small, slender, short, bidentate apically, cheeks and post-genae fairly wide. Thorax oval, nearly as wide as head and fairly deep, prothorax forming a tuberculate "neck," mesoscutum and scutellum convex, not separated, the latter with two large oblique foveae laterally at the base, apically produced into a short spinous process, metanotum depressed, pleurae subconvex, with a fascia of silvery white hairs at apical margin. Abdomen pointed ovate, as long as head and thorax combined, depressed and laterally carinate, 1st segment wider than long and longitudinally striate, second longest, occupying most of the tergal surface, the following all short, 3rd and 4th transverse, 5th and 6th produced into a cauda. Wings hyaline, moderately long and wide, apparently veinless. Legs moderately long and slender, only the coxae and femora apically a little stouter.

Described from four specimens collected at Tuaefu, Upolu, Samoan Islands, Sept. 16th, 1923, by Messrs. Swezey and Wilder.

DIAPRIINAE

Trichopria savaiiensis n. sp.

Female.—2.25 mm. long, reddish brown, abdomen dorsally fuscous brown, smooth and polished. Head globose, a little wider than thorax, occipital foramen margined, eyes small, oval, convex, naked; fronto-vertex slightly convex, wider than long, excavated anteriorly where the antennae are attached behind a projecting ledge, ocelli arranged in the form of a small, obtuse triangle on vertex, lateral members three times as far from eye margin as from anterior ocellus, face flat, nearly as wide as long, retracted

and lying in an oblique plane so that the mouthparts are behind the eyes; mandibles small, short, bidentate at apex; palpi normal; genae and postgenae quite wide; antennae 12-jointed, long filamentous, reaching base of abdomen, subclavate apically, scape long, slightly expanded, flattened, curved, longer than head, pedicel shorter than 1st funicle joint, subequal with 2nd to 6th, club 4-jointed, the individual joints about as wide as long, the last pointed, and greatest width (in last two joints) more than double the width of the funicle joints, all the distal joints clothed with a short, white pile. Thorax ovate, fairly wide and deep, pronotum developed into a conspicuous neck, the dorsal surface of which is striate; pronotum also well developed, collar-shaped and wider laterally in the wings than in the yoke at middle; mesoscutum triangular, flat, with a discal pit on either side not far from apical margin; scutellum subquadrate or keystone-shaped, flat, with a large fovea at base, lateral and apical borders margined, axillae well separated; metanotum flat at sides, medially elevated by a raised longitudinal carina which bifurcates at apical margin and forms a rounded, concave, marginate apical border; pleurae flat, smooth, only the metapleurae thickly clothed with appressed, whitish hairs. Abdomen ovate, pedicellate, apically pointed, 2nd segment occupying more than half the length, following segments short, transverse, pedicel twice as long as wide, rugosely sculptured and thickly clothed with long, appressed, whitish hairs, especially at sides. Legs moderately long, slender, only the coxae and femora stout. Wings moderately long and wide, with brownish suffusion, quite hairy and with fairly long marginal cilia, marginal vein a very small triangular stigma at proximal third of wing with a minute upper projection indicating postmarginal vein, and a minute lower projection indicating stigmal vein, submarginal vein very distinct.

Described from one specimen collected May 2nd, 1924, at Safune, Savaii, Samoan Islands, in rain forest 2000–4000 ft. elev., by E. H. Bryan, Jr. Two other female specimens in the collection, one taken on May 9th, 1924, in same locality by Mr. Bryan, and another collected at Pago Pago, Tutuila, Sept. 24th, 1923, by Messrs. Swezey and Wilder, appear to be the same species. A male specimen, also probably the same species, collected in the same locality as the type on May 13th, 1924, by Mr. Bryan, has the flagellar joints of the antennae all monilliform and the abdomen truncate apically.

Note on Ananca bicolor (Fairm.) (Col.)

BY RALPH H. MARLOWE
U. S. Bureau of Entomology and Plant Quarantine

(Presented at the meeting of December 1, 1938)

While studying the trapping methods for the melon fly, *Dacus cucurbitae* (Coq.) in 1936, some glass traps were placed in the vegetable garden at the quarantine station on Sand Island, Honolulu, T. H. Incidental catch included the Oedemerid beetle, *Ananca bicolor* (Fairm.), which was observed in abundance during June, July and part of August. The record of the number caught in the traps are presented in the following table:

NUMBER OF *Ananca bicolor* CAUGHT IN TRAPS ON SAND ISLAND

1936	Trap location	Ammoniated proprietary lure			Laundry soap solution		
		No. of trap days[1]	Total beetles caught	Aver. beetles caught per trap/day	No. of trap days	Total beetles caught	Aver. beetles caught per trap/day
May	gourd	..	....	...	21	6	0.3
	bean	..	....	...	7	1	0.1
June	gourd	7	88	12.6	7	104	14.9
	bean	28	804	28.7	28	1018	36.4
July	gourd	58	5681	97.9	50	979	19.6
	bean	28	1266	45.2	22	171	7.8
August ..	gourd	14	323	23.1	..	...	...
	bean	7	8	1.1	7	24	3.4

[1] Trap days indicates number of traps times days of trapping. Contents of traps were examined and the bait was changed at 7 to 8 day intervals.

The heaviest infestation of *Ananca bicolor* in the garden was in a small stand of sweet corn located near the beans and gourds. The beetles were in the tassels and at the base of the leaves. Observations on the number present were not made as traps had not been placed in the corn.

The gardener destroyed thousands of the beetles by shaking the corn tassels over a can of kerosene.

During the spring and summer of 1936 a large number of ironwood trees were cut on the island. This may have been the source of the infestation.

Dolichopodides des Iles Hawaii

recuellis par Monsieur F. X. Williams, principalement au cours de l'année 1936

PAR L'ABBÉ O. PARENT

Directeur Laboratoire Maritime, Ambleteuse (P.-de-C.)

(Presented by F. X. Williams at the meeting of November 3, 1938)

Genre CAMPSICNEMUS Walker

1. C. acuticornis n. sp. (fig. 1).

Male. Front vert noir, terni par un poudré. Face étroite blanc d'argent. Antennes rouges, l'article 3 noir, au moins 1 fois ½ aussi long que large, triangulaire pointu; soie simple. Mesonotum brun rouille, plutôt terne, une seule série de soies acrosticales, 3 chètes d.c. Ecusson jaune. Metaphragme jaune avec un point noir sur le disque; flancs jaunes, une tache noire sous la racine de l'aile; métaépimere jaune. Abdomen noir brun, le segment 1 jaune. Hanches jaunes, II noires à la face externe. Patte I: tibia un chète dorsal; tarse: article 3 au plus égal à l'article 2. Patte II (fig. 1): femur, face ventrale, sur le tiers médian, une série de chètes presque aussi longs que le travers. Tibia, face ventrale, sur le tiers basilaire, une serie de soies simples, 1 fois ½ aussi longues que le travers; face antérieure, sur les cinquiémes 2 et 3, une ciliation 3-4 fois aussi longue que le travers. Protarse plus long que l'article suivant. Patte III: femur, 1 préapical, protarse à peine plus court que l'article suivant. Ailes grisâtres, nervures 3 et 4 parallèles, transverse postérieure égale aux 2/5 de la section apicale de la 5è. Balanciers jaunes. Cuillerons à cils noirs. Long: 1.25 mm.

Femelle inconnue.

OAHU: Lulumahu Stream; Konahuanui Trail, 27.X.36.

2. C. bellulus V.D. OAHU: Konahuanui Trail, 14.X.36; Lulumahu Valley, 11.IX.36; Mt. Olympus, 26.VII.36; Tantalus Trail, Honolulu, 1800 ft.

3. C. bicoloripes Par. "A water skater." OAHU: Mt. Kaala, 3600 ft, 30.VIII.36.

4. C. breviciliatus n. sp. (fig. 2).

Male. Front vert métallique brillant. Face extrêmement étroite, jaune. Antennes jaunes, l'article 3 brun au moins au bord dorsal, plus long que large, triangulaire aigu; soie simple, presque basilaire. Mesonotum jaune luisant, bruni sur le disque, pas de soies acrosticales; 4 d.c., la 3è plus faible. Ecusson jaune, 2 chètes. Flancs jaunes, une tache noire sous la racine de l'aile. Métaépimére jaune, metaphragme noir. Abdomen noir bronzé, à part la moitié basilaire du premier segment jaune. Hanches jaunes, II noires à la face externe; I pratiquement glabre, III avec un chéte externe noir. Trochanters et pattes jaunes, les derniers articles des tarses à peine brunis. Patte I inerme, tarse 1 fois ½ aussi long que le tibia, protarse égal aux trois articles suivants réunis, l'article 3 égal à l'article 2. Patte II (fig. 2): femur, pas de préapical, face ventrale, sur les 3/5 apicaux, plusieurs séries d'épines de longueur décroissante vers l'apex, les basilaires

longues comme le demi-travers du femur. Tibia non épaissi, face dorsale, un chète au tiers apical, terminant une ciliation un peu irréguliére, égale, longue comme le travers. Protarse plus long que l'article suivant. Patte III: femur, un préapical; protarse de peu, mais nettement plus long que l'article suivant. Ailes légèrement brunies, 3 et 4 paralléles, transverse postérieure égale aux 2/5 de la section apicale de la 5è. Balanciers jaunes. Cuillerons noirs à cils noirs. Long: 1.75 mm.

Femelle. Face à peine plus large que chez le male, jaune. Quatre d.c., le 3è plus faible. Femur II: un preapical; tibia II: face dorsale, 3 antérieurs, 1 postérieur; tibia III: 2 ventraux. Pour le reste, à part l'ornementation des pattes, semblable au male.

OAHU: Punaluu or Kaluanui, 18.X.36.

5. C. deficiens n. sp. (fig. 3).*

Male. Front noir. Face trés étroite, jaune. Antennes jaune rouge, l'article 3 brun, 1 fois ½ aussi long que large, triangulaire pointu, soie simple. Mesonotum jaune rouille, peu brillant, brunâtre à l'arrière, 3 d.c. pas d'acrosticales. Ecusson rouge brun. Flancs rouges avec une tache noire sous la racine de l'aile. Metaépimére jaune. Abdomen noir brun, le Ier segment jaune. Hanches jaunes, II noires à la face externe. Trochanters et pattes jaunes, le femur III brun sur la moitié apicale. Patte I inerme, l'article 3 du tarse au plus aussi long que 2. Patte II (fig. 3): femur inerme. Tibia, face dorsale, 2 chètes, l'un au tiers basilaire, l'autre au tiers apical. Protarse plus long que l'article suivant. Patte III: femur, face ventrale, moitié apicale. 3–4 soies longues comme le travers. Protarse légèrement plus court que l'article suivant. Ailes grisâtres, 3 et 4 parallèles, transverse postérieure égale à la moitié de la section apicale de la 5è. Balanciers jaunes. Cuillerons a cils noirs. Long: 1.5 mm.

Femelle inconnue.

OAHU: Lulumahu Stream, 1900 ft., slopes of valley, 22.IX.36.

6. C. depauperatus n. sp. (fig. 4).*

Male. Front noir terni par un poudré gris. Face très étroite, jaune pale. Antennes brunes rougeâtres à la base; article 3 pas plus long que large, arrondi, soie simple. Mesonotum jaune rouille plutôt terne, 4 d.c. pas de soies acrosticales. Ecusson jaune rouille, ainsi que les flancs. Métaépimére noire. Abdomen noire brun. Hanches jaunes, II noires à la face externe. Trochanters et pattes jaune rouille. Patte I inerme, l'article 3 du tarse plus court que 2. Patte II (fig. 4): femur, face ventrale, sur le tiers médian, une série de 5 chètes longs comme le travers. Tibia, face ventrale, sur les 2/3 basilaires, une série de chètes tronqués trés fins et plus courts que le travers, face dorsale, au tiers basilaires, 2 chètes jumelés; face antérieure, sur le tiers médian, une ciliation plus longue que le travers. Protarse plus long que l'article suivant. Tarse III tombé. Ailes teintées de rouille, 3 et 4 parallèles; transverse postérieure égale aux 2/3 du segment apical de la 5è. Balanciers jaunes. Cuillerons a cils noirs. Long: 1.75 mm.

Femelle inconnue.

OAHU: Olympus, Octobre.

7. C. flexuosus n. sp. (fig. 5).

Male. Front vert métallique brillant. Face oblitérée, jaune à l'apex. Antennes jaune rouge, l'article 3 brun, pas plus long que large, triangulaire

* Types of the new species marked by an asterisk (*) are in Honolulu in the collection of the Hawaiian Entomological Society. (F.X.W.)

aigu; soie simple, presque basilaire. Mesonotum jaune luisant, une strie brune jalonnée par les chètes d.c. au nombre de 3, pas de soies acrosticales. Ecusson jaune, 2 chètes. Flancs jaunes, une tache noire sous la racine de l'aile. Métaépimére et metaphragme jaunes. Abdomen noir bronzé, les premiers segments jaunes par transparence. Hanches jaunes, II noires à la face externe; I pratiquement glabre, à soies apicales noires; III: un chète externe noir. Trochanters et pattes jaunes. Patte I inerme, tibia aussi long que le femur, tarse 1 fois ½ aussi long que le tibia, protarse égal aux deux articles suivants reunis, 3 égal à 2. Patte II (fig. 5): femur sans préapical, face ventrale nu, à part, trés prés de l'apex un peigne serré de chètes épines plus courts que le travers. Tibia grêle, sinueux, sans chètes; face postérieure, au tiers basilaire, un peigne de 5–6 soies courtes; face antérieure, sur le cinquième apical, une ciliation fine, arquée, plus longue que le travers. Tarse, sur les 3 premiers articles, face dorsale, une ciliation régulière, fine, érigée. dont les éléments arqués à l'arrière, sont de longueur décroissante vers l'apex. Protarse plus long que l'article suivant. Patte III: femur, un préapical; protarse à peine plus court que l'article suivant. Ailes grisâtres, 3 et 4 légèrement divergentes; transverse postérieure égale à la moitié du segment apical de la 5è. Balanciers jaunes. Cuillerons noirs à cils noirs. Long: 1.5 mm.

Femelle. Je ne suis pas certain que la femelle rapportée au male précedémment décrit lui appartienne.

OAHU: Lulumahu Stream, 1900 ft., slopes of valley; Konahuanui Trail, IX.36.

8. C. fragilis n. sp. (fig. 6).

Male. Front vert métallique brillant. Face oblitérée, jaune a l'apex. Antennes jaune rouge, l'article 3 noir à l'apex et au bord dorsal, 1 fois ½ aussi long que large, triangulaire aigu; soie simple, presque basilaire. Mesonotum jaune rouge, luisant, deux stries brunes, jalonnées par les d.c. qui sont au nombre de 3, pas des soies acrosticales. Ecusson jaune, 2 chètes. Flancs jaunes, une tache noire sous la racine de l'aile. Métaépimère et métaphragme jaunes. Abdomen: segment 1 jaune, les autres brun noir, jaunes a la base par transparence. Hanches jaunes, II brunes, face externe; I pratiquement glabres, à soies apicales noires, III un chète externe noir. Trochanters et pattes jaunes, les derniers articles des tarses brunis. Patte I inerme; tibia court; tarse presque 2 fois aussi long que lui, protarse épaissi à la base ventrale, légèrement arqué, égal aux 3 articles suivants réunis, 3 nettement plus long que 2. Patte II (fig. 6): femur, face ventrale, sur les 2/3 apicaux, avec une série de chètes épines dont les médians sont les plus longs et mesurent les 2/3 du travers. Tibia, sur le quart basilaire, grêle puis modérément mais brusquement épaissi, l'abrupt presentant, face antérieure, une séries dense de soies courtes et face postérieure 2 chètes jumelés; face ventrale, une série regulière de chètes égaux non tronqués, longs comme le travers. Protarse plus long que l'article suivant. Patte III: femur, un chète préapical. Protarse de peu mais nettement plus court que l'article suivant. Ailes grisâtres; 3 et 4 parallèles; transverse postérieure égale a la moitié du segment apical de la 5è. Balanciers jaunes. Cuillerons à cils noirs. Long: 1.5 mm.

Femelle inconnue.

OAHU: Olympus, 26.VIII.26, 2300–2400 ft.

9. C. flavicornis V.D. OAHU: Mt. Olympus, 2400 ft., VIII.36; Mt. Kaala, 1800 ft., 30.VIII.36; Konahuanui, 3000 ft.; Palikea, Waianae Mts., 2800 ft.

10. C. fumipennis Par. (fig. 7.)*

Male. Front terni par un poudré faune. Face presque oblitérée par le rapprochement des yeux, entièrement jaune fauve. Cils postoculaires inferieurs jaunes, bruns à certaine incidence. Antennes jaune rougeâtre. l'article I noirci à l'apex dorsal, 2 au bord apical, 3 au moins 2 fois aussi long que large, pointu à l'apex, jaune blanc, étroitement bordé de noir sur tout le pourtour; soie fine, pubescente, 1 fois ½ aussi longue que la face. Mesonotum jaune brun, assez brillant; de chaque côté une large fascie noire intéressant la série de soies d.c. qui sont au nombre de 5 dont le premier plus faible. Soies acrosticales unisériées, fines et courtes. Flancs jaune brunâtre, plus ou moins marqués de brunâtre; une tache noir profond sous les cuillerons, un prothoracique noir. Métaépimére jaune. Ecusson noir, 2 chètes. Metaphragme jaune roux avec une tache discale brun noir. Abdomen noir bleuâtre, à vestiture noire, les segments tachés latéralement de jaune. Hypopyge réduit. Hanches I jaunes a vestiture noire, II noires à la face externe, III noires, marquées de jaune. Trochanters jaunes II et III variés de noir. Femurs jaune rouille, III noir sur le sixième apical. Tibias I et II jaune rouille, noircis, face dorsale; III noir. Tarses noir, brun, protarse I jaunâtre sur la moitié basilaire. Patte I simple, tibia avec un chète dorsal vers le milieu, tarse au moins 1 fois ½ aussi long que le tibia, protarse égal aux 3 articles suivants réunis. Patte II (fig. 7): femur assez épais, face ventrale, sur toute sa longueur, avec une série dense de soies chètiformes noires, fines, un peu moins longues que le travers. Tibia 1 fois ½ aussi long que le femur, légèrement sigmatiforme; face dorsale, ligne postérieure, avec 2 chètes fins, le 2è plus long, un peu avant le milieu; ligne antérieure, avec une double série de soies folles noires, 3 fois aussi longues que le travers; face ventrale, ligne postérieure, sur ses ¾ basilaires, une série de soies fines, chètiformes, de longueur uniforme, pointues à l'apex; ligne antérieure, moitié apicale, une série de longues soies folles. Tarse plus court que le tibia, protarse 1 fois ½ aussi long que l'article suivant; tous les articles à ciliation fine à la face antérieure, plus longue au protarse. Patte III: femur, 1 préapical. Tibia sans vrais chètes à la face ventrale. Tarse sensiblement égal au tibia; protarse de peu mais nettement plus long que l'article suivant. Ailes brunies par places, plus particulièrement dans la région de la transverse postérieure; 3 et 4 sensiblement parallèles; transverse postérieure égale aux 4/5 du segment apical de la 5è. Balanciers jaunes. Cuillerons à cils noirs. Long: 3.5 mm.

Femelle déjà décrite.

OAHU: Lulumahu Valley, 1750 ft., "on banana stem," 8.XI.36; Lulumahu Stream, Konahuanui, 1700 ft., 30.IX.36.

11. C. furax n. sp. (fig. 8).

Male. Front vert métallique brillant. Face oblitérée, jaune au moins à l'apex. Antennes jaune rouge, l'article 3 bruni sur les bords, pas plus long que large, triangulaire aigu; soie simple, presque basilaire. Mesonotum jaune rouge au fond, peu brillant par suite d'un givré gris jaune, bruni sur la ligne des chètes d.c. sont au nombre de 4. Pas de soies acrosticales. Ecusson de même teinte que le mesonotum. Flancs jaune rouge en haut, jaune pale en bas; une tache brune sous la racine de l'aile, métaépimére jaune, metaphragme noir. Abdomen noir bronzé. Hanches jaune clair, II brune à la face externe, I pratiquement glabre, à soies apicales noires, III avec un chète externe noir. Trochanters et pattes jaune clair, les derniers articles des tarses à peine brunis. Patte I inerme; tarse 1 fois ¼ aussi long que le tibia, protarse égal aux 3 articles suivants réunis, 3 au moins égal à 2. Patte II (fig. 8): femur sans préapical, face ventrale, sur le tiers médian, une série de chètes épines, presque aussi longs que le

travers. Tibia sans chètes ni épaississement; face dorsale, ligne antérieure, tout au long, une ciliation 1 fois ½ aussi longue que le travers; ligne postérieure, une ciliation semblable régnant seulement sur le tiers basilaire; face ventrale, sur les 3/5 basilaires, une serie reguliere de chètes non tronqués, plus courts que le travers. Protarse plus long que l'article suivant. Patte III: femur, un préapical. Protarse de peu mais nettement plus court que l'article suivant. Ailes grisâtres; 3 et 4 parallèles; transverse postérieure égale à la moitié du segment apical de la 5è. Balanciers jaunes. Cuillerons noirs à cils noirs. Long: 2 mm.

Femelle. Tibia I, un chète dorsal. Patte II: femur, un préapical, tibia, face dorsale, 3 chètes antérieurs, 1 postérieur, un ventral. Tibia III: 2 chètes ventraux. Du reste semblable au male.

OAHU: Mt. Kaala, 3600 ft., 30.VIII.36.

12. **C. gloriosus** V.D. "A water skater." OAHU: Mt. Kaala, 3600 ft., 30.VIII.36; Punaluu or Kaluanui; Konahuanui Trail, 2000 ft., 19.IX; Lulumahu Stream, 1900 ft., Octobre.

13. **C. longiciliatus** n. sp. (figs. 9–11).*

Male. Front vert metallique brillant. Face oblitérée, jaune au moins à l'apex. Antennes jaune rouge, l'article 3 légèrement bruni, guère plus long que large, triangulaire aigu; soie simple, presque basilaire. Mesonotum luisant, jaune rouge, sur le pourtour, vert métallique sur le disque. Soies d.c. 3–4 ? pas acrosticales. Ecusson jaune, flancs jaunes; une large tache noire sous la racine de l'aile; metaphragme jaune. Abdomen noir bronzé à part le segment 1 jaune. Hanches jaunes, II noire à la face externe, I pratiquement glabre, à soies apicales noires, III avec un chète externe noir. Trochanters et pattes jaunes, Patte I (fig. 9) inerme, femur, face ventrale, avec 3–4 soies apicales. Tarse presque 2 fois aussi long que le tibia, protarse arqué, long comme les 3 articles suivants réunis; 3, 1 fois ½ aussi long que 2. Patte II (figs. 10 et 11): femur, pas de préapical, face ventrale, sur les ¾ apicaux, avec une série de chètes épines, fins, de longueur décroissante vers l'apex, les basilaires presque égaux au travers. Tibia non épaissi, arqué, concave à la face dorsale; face antérieure, ligne ventrale, tout au long, avec une série dense de soies longues au moins 3 fois comme le travers, se prolongeant sur le protarse; ligne dorsale, tout à la base, un courte série de longues soies frisées, arquées; face ventrale sur la moitié basilaire, une série régulière de chètes de même longueur et non tronqués, plus courts que le travers. Protarse plus long que l'article 2. Patte III: femur, un preapical, protarse plus court que l'article 2. Ailes grisâtres, 3 et 4 parallèles, transverse postérieure égale a la moitié de la section apicale de la 5è. Balanciers jaune pale. Cuillerons à cils noirs. Long: 1.75 mm.

Femelle inconnue.

OAHU: Konahuanui Trail, 2000 ft., 19.IX.36.

14. **C. macula** n. sp. (fig. 12).*

Male. Front entierement terni par un poudré brun. Face très étroite, blanc argent à l'apex. Antennes jaune rouge, l'article 3 brun, pas plus long que large, obtus. Mesonotum bronzé cuivreux, terni par un poudré gris; 4 d.c. pas d'acrosticales. Ecusson et flancs noirs. Abdomen noir bronzé. Hanches I jaunes, les autres noires, I pratiquement glabres, à soies apicales noires, III avec un chète externe noir. Trochanters et pattes jaunes, les derniers articles des tarses brunis. Patte I inerme, tarse au moins 1 fois ½ aussi long que le tibia, protarse renflé ventralement a la racine, un peu plus court que les 2 articles suivants réunis, les articles de longueur régulière-

ment décroissante. Patte II (fig. 12): femur pas de préapical, face ventrale, une série de 6–7 épines plus longues que le travers. Tibia sans chètes à part les apicaux; face ventrale, tout au long, une série régulière de chètes pointus égaux, longs comme le travers; face antérieure, sur les 3/5 basilaires, une ciliation grossière dense, noir profond, au moins aussi longue que le travers, et de tracé oblique. Patte III: femur, un préapical, protarse légèrement plus court que l'article suivant. Ailes grises; transverse postérieure largement nimbée de brun, 3 et 4 paralleles; transverse posterieure égale à la moitié du segment apical de la 5è. Balanciers jaunes. Cuillerons à cils noirs. Long: 1.5 mm.

Femelle. Face jaune brun. Antennes plus sombres. Tibia I avec un chète dorsal. Femur II avec un préapical; son tibia, face dorsale, avec 2 chètes antérieurs et 1 postérieur.

OAHU: Palikea, Waianae Mts., 15.XI. MAUI: Haleakala, 2000 ft., 20.XII.36.

15. C. membranilobus n. sp. (fig. 13).

Male. Front vert métallique brillant. Face oblitérée jaune, au moins a l'apex. Antennes entièrement jaune rouge, l'article 3 un peu plus long que large, triangulaire aigu; soie normale, presque basilaire. Mesonotum jaune rouge luisant, 4 d.c. pas d'acrosticales. Ecusson jaune rouge, brun à l'extreme base. Flancs jaune rouge, une tache noire sous la racine de l'aile, métaépimére jaune, metaphragme jaune, noir sur le disque. Abdomen; segment 1 jaune, les autres noir bronzé brillant. Hanches jaunes, II noires à la face externe, I pratiquement glabre, à soies apicales noires, III avec un chète externe noir. Trochanters et pattes jaunes a part aux tarses I le dernier article noir; aux tarses II et III les derniers articles brunis. Patte I: inerme, tarse un peu plus long que le tibia, protarse 1 fois 1/3 aussi long que le reste, article 3 égal à 2; les articles 4 et 5 très courts. Patte II (fig. 13): femur, un préapical; face ventrale, sur ses deux quarts médians, une série de chètes épines de longueur décroissante vers l'apex, les basilaires plus courts que le travers. Tibia progressivement et fortement épaissi, jusque près de l'apex; sa face dorsale aplatie, les cotés membraneux enroulés vers l'intérieur; face dorsale, ligne postérieure, au tiers apical, un chète robuste; sur la même ligne et sur la moitié basilaire, une série régulière de chètes fins; ligne antérieure vers le tiers apical, une série de 3 chètes épais et courts; au même niveau vers l'intérieur, une plage dense de chètules noirs formant tache; face ventrale, sur le tiers apical, une série de soies de longueur croissante vers l'apex. Protarse égal au quart de l'article suivant, présentant à l'apex un ergot noir, droit et se prolongeant dorsalement en un lobe membraneux, jaune, triangulaire, qui atteint le milieu de l'article suivant. Patte III: femur, un préapical. Tibia a chètes dorsaux longs. Protarse légèrement plus court que l'article suivant. Ailes grisâtres; 3 et 4 parallèles; transverse postérieure égale à la moitié de la section apicale de la 5è. Balanciers jaunes. Cuillerons à cils noirs. Long: 2.25 mm.

Femelle inconnue.

OAHU: Mt. Kaala, 1800 ft., 30.VIII, F. X. Williams; Keekee Gulch, 25.IX.34, on *Osmanthus,* O. H. Swezey.

16. C. miritibialis V.D. "A water skater." OAHU: Lulumahu Stream, 1800 ft., X.36.

17. C. miser n. sp. (fig. 14).*

Male. Front vert sombre brillant. Face très étroite jaune. Antennes jaune rouge, l'article 3 en partie noir, plus long que large; soie simple.

Mesonotum noir brun, à légers reflets vert métallique, 4 d.c. une série d'acrosticales. Ecusson noir verdâtre; flancs verts en haut, jaunes en bas. Abdomen noir brun, à reflets verts sur es flancs, le segment 1 jaune. Hanches jaunes, II noire à la face externe. Trochanters et pattes jaunes. Patte I: tibia avec au moins un chète dorsal; article 3 du tarse au plus égal a 2. Patte II (fig. 14): femur, face ventrale, sur les 2/3 apicaux, une série de chètes d'abord espacés et presque aussi longs que le travers, puis plus courts et plus denses. Tibia, face ventrale, sur les 2/5 basilaires, une serie de chètes tronqués plus courts que le travers; face dorsale, 2 chètes basilaires jumelés; aucune ciliation remarquable. Protarse plus long que l'article suivant, l'article 3 un peu plus court que 2. Ailes grisâtres, 3 et 4 légèrement divergentes, à l'apex; transverse postérieure égale à la moitié du segment apical de la 5è. Balanciers jaunes. Cuillerons à cils noirs. Long: 2 mm.

Femelle inconnue.

OAHU: Mt. Olympus, Novembre.

18. C. nigroanalis n. sp. (fig. 15).

Male. Front vert métallique brillant. Face très étroite, jaune. Antennes jaune rouge, l'article 3 brun, triangulaire aigu, un peu plus long que large; soie simple, basilaire. Mesonotum jaune luisant, 3 d.c. pas d'acrosticales. Ecusson et flancs jaunes, une tache noire au dessous de la racine de l'aile. Abdomen jaune luisant; hypopyge noir. Hanches jaunes, II largement noire à la face externe, I pratiquement glabre, à soies apicales noires, III avec un chète noir externe. Trochanters et pattes jaunes, les derniers articles des tarses brunis. Patte I inerme, tarse 1 fois ½ aussi long que le tibia, protarse égal aux 2 articles suivants réunis; 3 sensiblement égal à 2, à peine plus court. Patte II (fig. 15): femur sans préapical, face ventrale tout au long, une série d'épines courtes, moins longues que le demi-travers, les 2 basilaires plus longues tranchant sur les autres. Tibia épaissi sur ses 3/5 basilaires; face dorsale, ligne postérieure dans la moitié basilaire, 2 chètes robustes; ligne postérieure peu avant l'apex, un autre chète robuste; face ventrale sur les 2/3 basilaires une série irrégulière de chètes dressés, de longueur croissante, les plus longs dépassant le travers. Tarse un peu plus long que le tibia, protarse égal au quart de l'article suivant, muni à l'apex d'un ergot noir, arqué. Patte III: femur, 1 préapical; face ventrale, tout au long, une série de chètes fins, les basilaires plus longs, égalant à peine le demi-travers. Protarse à peine plus court que l'article suivant. Ailes grisâtres; 3 et 4 parallèles; transverse postérieure égale aux 2/5 de la section apicale de la 5è. Balanciers jaunes. Cuillerons noirs, à cils noirs. Long: 1.5 mm.

Femelle. Trois d.c. Tibia I: un chète dorsal au milieu. Femur II, un préapical. Tibia II: face dorsale, 2 chètes antérieurs dans la moitié basilaire, un postérieur, un ventral. Abdomen à segments bordés de noir à l'arrière, le dernier entièrement noir.

OAHU: Olympus, 1 Nov., 36.

19. C. olympicola n. sp.

Male. Front terne. Face oblitérée, brune a l'apex. Antennes noires, rougeâtres à la racine; article 3 pas plus long que large, triangulaire aigu; soie simple, presque basilaire. Mesonotum noir bleu métallique au fond, terni par un poudré brun, 3 d.c.; pas d'acrosticales. Ecusson de même couleur, flancs sombres. Abdomen noir brun. Hanches jaunes, II noires à la face externe, I pratiquement glabre, à soies apicales noires, III avec une soie externe noire. Trochanters et pattes jaune pale, les femurs blan-

châtres, le femur III bruni sur les 2/5 apicaux. Pattes toutes simples, les femurs sans préapical, tarses I et II à articles de longueur régulièrement décroissante; protarse III légèrement plus court que l'article 2. Ailes grisâtres, 3 et 4 parallèles; transverse postérieure égale à la moitié de la section apicale de la 5è. Balanciers noirs. Cuillerons à cils noirs. Long: 1.5 mm.

Femelle semblable au male, en particulier à balanciers noirs.

OAHU: Mt. Olympus, 26 July, ground, 2000 ft.; Konahuanui, 2000 ft., 19 Sept.

20. C. ornatus V.D. = *strigosus* V.D. OAHU: Mt. Kaala, 3660 ft., Aug. 36; Olympus, 2300 ft., 23 Aug.; Punaluu or Kaluanui; Lulumahu Stream, 1700 ft.; Manoa; Punaluu Valley; Konahuanui Trail.

La comparison des types par F. X. Williams et des descriptions par moi-même ne laisse pas de doute sur cette synonymie.

21. C. pallidus n. sp.*

Femelle. Front gris noir terne. Face jaune blanc. Antennes entièrement jaune blanc, l'article 3 pas plus long que large, obtus; soie noire. Mesonotum plutot terne, jaune, 4 d.c. pas d'acrosticales. Ecusson et flancs entièrement jaune pale, 1 prothoracique jaune. Abdomen jaune très pale, l'anus noir; vestiture entièrement pale. Hanches et pattes jaune blanc, à pilosité blanche, seuls les chètes noirs; hanches I à vestiture entièrement pale. Femurs II et III avec un préapical, protarse III plus court que l'article suivant. Ailes blanches à nervures jaunes. Balanciers jaunes. Cuillerons jaunes à cils jaunes. Long: 1.75 mm.

Male inconnu.

OAHU: Mt. Olympus, 2200 ft., damp ground, on herbage, III.36.

Le male se reconnaitra sûrement a la couleur du corps et des antennes.

22. C. patellifer Grimshaw. OAHU: Pauoa, Manoa Cliff Trail, Honolulu, 1800 ft.; Punaluu or Kaluanui; Pauoa, Manoa Cliff Trail, Tantalus, 1200 ft.; Hering Valley, Tantalus; Waihi-iki Falls, Manoa. D'après F. X. Williams (in litt.) ne diffère pas de *C. nudifemoratus* V.D., decrit en mauvais état, et qui tombe, par suite, en synonymie.

23. C. planitibia n. sp. (fig. 16).

Male. Front vert métallique au fond, peu brillant. Face oblitérée, jaune. Antennes rouges, l'article 3 bruni pas plus long que large, triangulaire aigu. Soie simple, presque basilaire. Mesonotum peu brillant, vert métallique au fond, transparaissant sous un poudré gris jaune; pas d'acrosticales, 4 d.c. Ecusson jaune, 2 chètes. Flancs noir vert en haut, jaune clair en bas. Métaépimère jaune, metaphragme jaune rouge, taché de brun. Abdomen noir brun. Hanches jaunes, I pratiquement glabre, II noire à la face externe, III avec un chète externe noir. Trochanters et pattes jaunes; les derniers articles des tarses plus ou moins brunis. Patte I inerme, tibia court, tarse 1 fois 1/3 aussi long que le tibia. Protares légèrement arqué,

long comme les deux articles suivants réunis; 3 une fois et demi aussi long que 2. Patte II (fig. 16): femur peu renflé, face ventrale, sur le tiers basilaire, avec deux longs chètes épines, plus longs que le travers, suivis de 4–5 chètes beaucoup plus courts. Tibia plus long que d'ordinaire, 1 fois 1/2 aussi long que le femur, aplati en lame, par suite paraissant fortement épaissi fusiforme. L'une des faces est partout courtement velue, l'autre glabre ou pratiquement telle dans la région médiane, sur toute sa longueur; l'un des bords, au cinquieme apical, présente un chète long et robuste, qui termine une ciliation irréguliere partant de la racine, fine, dense, plus longue que le travers maximum; à l'autre bord, sur le tiers médian, 2 chètes assez robustes, suivis d'une plage dense de microchètes noirs. Tarse égal aux 3/5 du tibia, le protarse égal à la moitié de l'article 2, et, à l'apex dorsal, portant un long ergot noir, droit, atteignant presque l'apex de l'article 2. Patte III: femur, un préapical, protarse légèrement plus court que l'article suivant. Ailes grisâtres, les nervures 3 et 4 parallèles; transverse postérieure égale à la moitié de la section apicale de la cinquième. Balanciers jaunes. Cuillerons a cils noirs. Long: 1.5 mm.

Femelle inconnue.

OAHU: Mt. Kaala, trail, 1800 ft., Aug. 36; Palikea, Waianae Mts., 2800 ft., Nov.

24. C. tarsiciliatus n. sp. (fig. 17).*

Male. Front terne, bronzé au fond, terni par un poudré brun fauve. Face très étroite, jaune. Antennes jaune rouge, l'article 3 brun, pas plus long que large, obtus; soie simple. Mesonotum brun rouge au fond, terni par un poudré brun; pas de soies acrosticales, 4 d.c. Ecusson noir, 2 chètes. Flancs noirs dans leur moitié dorsale, jaunes en dessous. Abdomen noir vert, terne. Hanches et pattes jaunes, les derniers articles des tarses brunis. Hanches I glabres, à soies apicales noires, III avec un chète externe noir. Patte I inerme, tarse au moins 1 fois ½ aussi long que le tibia, protarse égal aux 3 articles suivants réunis, 3 au moins égal à 2. Patte II (fig. 17): femur sans préapical; face ventrale, presque dès la base, avec une série d'épines noires, les plus longues égales au travers. Tibia non épaissi, sans chètes en dehors des apicaux; face antérieure, une ciliation tres fine espacée, à éléments arqués a l'apex, se continuant sur les articles du tarse; celui-ci 1 fois ½ aussi long que le tibia; protarse égal aux 3 articles suivants réunis. Patte III: femur avec un préapical. Tibia, face dorsale, 2 chètes antérieurs, 1 postérieur, un seul ventral. Protarse de peu mais nettement plus court que l'article suivant. Ailes grisâtres, les nervures 3 et 4 pratiquement parallèles; transverse postérieure égale aux 2/3 de la section apicale de la 5è. Balanciers jaunes. Cuillerons a cils noirs. Long: 1.5 mm.

Femelle inconnue.

OAHU: Palikea, Nov.

25. C. vafellus n. sp. (figs. 18 et 19).

Male. Front vert métallique brillant. Face très étroite, jaune. Antennes jaune rouge, l'article 3 bruni au moins sur le pourtour, triangulaire aigu, 1 fois ½ aussi long que large; soie simple, insérée au tiers basilaire. Mesonotum et écusson jaune brillant; pas de soies acrosticales, 4 d.c. Flancs jaunes, une tache noire au dessous de la racine de l'aile; méta-épimére jaune, metaphragme jaune, noir au centre. Abdomen noir. Hanches jaunes, II largement brunie à la face externe, I glabre, à soies apicales noires; III, un chète externe noir. Trochanters et pattes jaunes, les derniers articles des tarses légèrement brunis. Patte I inerme, tarse 1 fois ½ aussi long que le tibia, protarse égal aux 3 articles suivants réunis;

3 au moins aussi long que 2. Patte II (figs. 18 et 19) : femur sans préapical, face ventrale, sur les 2/3 apicaux, muni d'épines fines, de longueur décroissante vers l'apex, les basilaires aussi longues que la travers. Tibia aplati dorso-ventralement et élargi fusiforme; face dorsale, ligne posterieure dans le dernier tiers, avec 2 chètes robustes; ligne anterieure, sur le 3è quart, une series de 3 chètes fins; au meme niveau sur la face dorsale, une plage de sétules noirs très serrés formant une tache noire. Tarse égal au tibia, protarse égal au quart de l'article 2, avec à l'apex, un ergot noir, souvent jaune a la base. Patte III: femur, 1 préapical; face ventrale, sur les 2/3 apicaux, une série de chètes fins inclinés, longs comme le tiers du travers. Tibia, face dorsale, 4 chètes postérieurs, 2 antérieurs, 2 chetes ventraux. Tarse un peu plus long que le tibia; protarse de peu, mais nettement plus court que l'article suivant. Ailes hyalines, 3 et 4 parallèles; transverse postérieure égale aux 2/5 de la section apicale de la 5è. Balanciers jaunes. Cuillerons noirs à cils noirs. Long: 2 mm.

Femelle. Face jaune très étroite. Article 3 des antennes pas plus long que large. Patte I, tibia, face dorsale, un chète avant le milieu; l'article 3 du tarse ègal a 2. Patte II: femur, un préapical; tibia, face dorsale, 3 antérieurs, 1 postérieur au tiers basilaires; face ventrale, 2 antérieurs. Patte III: femur, un préapical, tibia face dorsale, 4 postérieurs, 3 antérieurs, 2 ventraux; protarse plus court que l'article 2. Pour le reste semblable au male, à part l'ornementation des pattes.

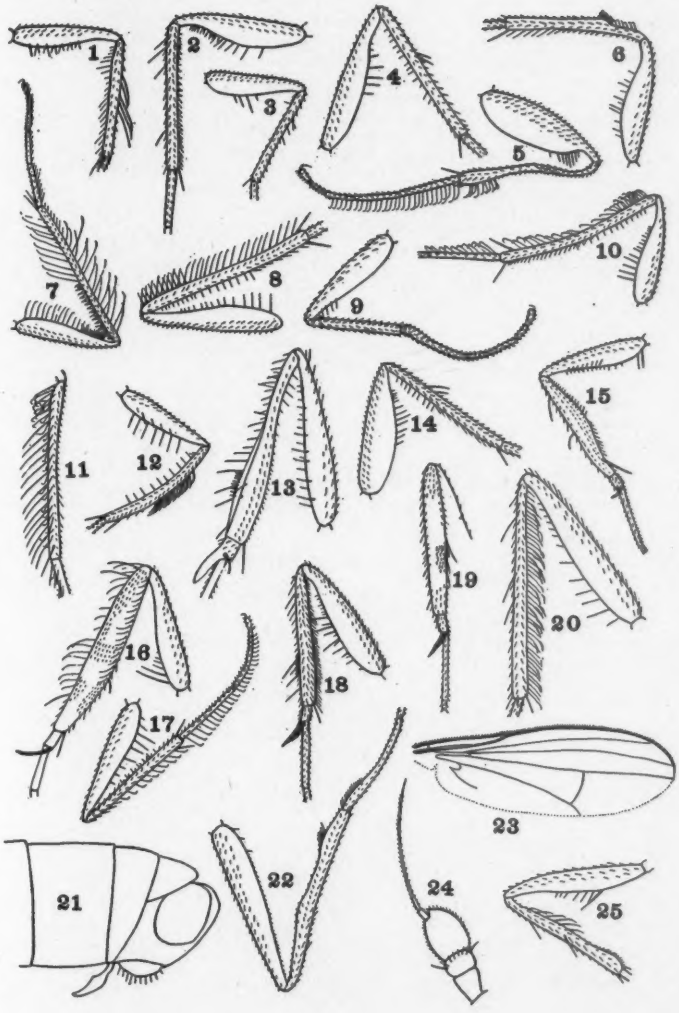
OAHU: Mt. Olympus, 2300–2400 ft., July; Lulumahu Stream, slopes of valley, 1900 ft., Sept.; Konahuanui, 3000 ft.; Mt. Kaala, 2900 ft.

26. C. williamsi V.D. "A water skater." OAHU: Mt. Kaala, Aug., 3600 ft.; Koolau Summit Trail, Nov., 2800 ft., on puddle.

DOLICHOPODIDAE

Planche XII

1. *Campsicnemus acuticornis* ♂, patte II.
2. " *breviciliatus* ♂, patte II.
3. " *deficiens* ♂, patte II.
4. " *depauperatus* ♂, patte II.
5. " *flexuosus* ♂, patte II.
6. " *fragilis* ♂, patte II.
7. " *fumipennis* ♂, patte II.
8. " *furax* ♂, patte II.
9. " *longiciliatus* ♂, patte I.
10. " " ♂, patte II.
11. " " ♂, tibia II (autre aspect).
12. " *macula* ♂, patte II.
13. " *membranilobus* ♂, patte II.
14. " *miser* ♂, patte II.
15. " *nigroanalis* ♂, patte II.
16. " *planitibia* ♂, patte II.
17. " *tarsiciliatus* ♂, patte II.
18. " *vafellus* ♂, patte II, de côte.
19. " " ♂, patte II, de dos.
20. *Eurynogaster apicenigra* ♂, patte II.
21. " *binodata* ♂, hypopyge.
22. " " ♂, patte II.
23. " " ♂, aile.
24. " *cilifemorata* ♂, antenne.
25. " " ♂, patte II.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Le nombre des espéces de *Campsicnemus* de la région Indo-Australienne ayant considerablement augmenté depuis la publication par Van Duzee de la clé des espèces Havayennes je crois utiles de donner ici un tableau comprenant toutes les espèces actuellement connues de la faune Indo-Australienne.

Males

1. Corps et antennes entièrement jaune blanc. (OAHU) . . *pallidus* n. sp.
   Non 2
2. Au moins une paire de pattes remarquable par la structure et la vestiture 3
   Pattes toutes simples 56
3. Femurs, tibias et tarses noirs 4
   Femurs et, habituellement, les tibias jaunes ou principalment jaunes 7
4. Hanche I avec une longue épine apicale. (MARQUISES) *scurra* Par.
   Non 5
5. Tibia II fortment épaissi avec, à la face dorsale, près du tiers apical, une paire d'épines aigües. Protarse II court, épais, avec un prolongement apical en forme d'ergot arqué vers le haut; article 2 inséré sur la face ventrale de l'article précedént. (OAHU) *miritibialis* V.D.
   Tibia II non ou à peine épaissi, avec une rangée latérale de chètes grêles, tronqués à l'apex 6
6. Patte I: tibia, face ventrale à pilosité plus longue au tiers basilaire; protarse avec 3 chètes à la base ventrale. Patte II: femur, face ventrale, avec une série irrégulière de soies fines, plus longues au tiers apical; tibia: 5 chetes dorsaux; protarse non épaissi, sane chètes dorsaux à l'apex, sans saillie ni crochet; article 2 deux fois aussi long que l'article suivant. (KAUAI) ..... *nigricollis* V.D.
   Patte I: tibia, face ventrale, à pilosité égale; protarse depourvu de chètes. Patte II: face ventrale, avec une série régulière de chètes égaux; tibia avec 2 chètes dorsaux; protarse épaissi, muni de chètes dorsaux, saillant en biseau à l'apex ou il presente un crochet; article 2, 1 fois ½ aussi long que l'article suivant. (MOLOKAI.) *obscurus* Par.
7. Soie antennaire simple 8
   Soie antennaire avec palette apicale. (OAHU.) *patellifer* Grimshaw
8. Aile avec une tache apicale nette et bien delimitée. (FORMOSE.) *intermittens* Beck.
   Non 9
9. Femur I, face ventrale, avec une mèche plate de 6 longues soies. (HAWAII) ..... *penicillatus* Par.
   Non 10
10. Tibia I, face dorsale, avec 3-4 soies chètiformes qui sont aussi longues que le protarse, celui-ci avec de longs poils à la base, de longueur décroissante vers l'apex. Tibia II à pilosite dorsale dense, très longue. Femur II muni d'un grand crochet à l'apex. (OAHU) *williamsi* V.D.
    Seul le tibia II à pilosité ou chètosité de longueur inusitée, souvent à vestiture de longueur modérée 11
11. Tibia II près de la base avec une apophyse arrondie 12
    Non 16
12. Tibia II, à l'apex, avec environ 5 chètes épais, arqués, très longs, l'apex du tibia dépassant l'insertion du protarse. (OAHU) *gloriosus* V.D.
    Tibia II sans longes chètes à l'apex, protarse insére a l'apex du tibia 13

13. Tibia II élargi, arqué sinueux, avec de longs poils sur les côtés spécialement sur la moitié apicale, face dorsale. (HAWAII) . *sinuatus* V.D.
Tibia II un peu arqué, peu ou pas sinueux 14
14. Tibia II doucement arqué, non élargi, plutôt grêle, frangé, face ventrale, de poils modérément longs, 2 foils aussi longs que le travers. Article 3 des antennes pas plus long que large, obtus à l'apex. (HAWAII) ..... *grimshawi* V.D.
Tibia II un peu concave a la face ventrale, considerablement élargi sur les 2/3 apicaux ou plus. Article 3 des antennes long pointu à l'apex. 15
15. Patte II: femur tres épaissi dans sa moitié basilaire. Tibia de contour un peu irrégulier, mais de largeur presque uniforme sur les $\frac{4}{5}$ apicaux, avec une touffe de long poils, face dorsale, au delà du milieu, et avec des poils plus courts à la face dorsale, spécialement aux deux extrémités; protarse sans chètes. (OAHU) ..... *crinitibia* V.D.
Patte II: femur modérément épaissi a la base, avec 3 chètes modérément longs prés de la base, face ventrale. Tibia vu du cote, arrondi, de façon égale sur les 2/3 apicaux, avec pilosité plutôt longue faces ventrale et dorsale et un chète dorsal prés de l'apex; vu d'en haut s'élargissant vers l'apex, se rétrécissant brusquement un peu avant l'apex avec une longue pilosité latérale sur la région la plus large; quelques poils chètiformes sur l'autre côté; protarse avec 2 petits chètes à la face dorsale. (OAHU) ..... *bellulus* V.D.
16. Tarse III: articles 1 et 2 très courts 17
Tarse III: tout au plus l'article 1 court 18
17. Flancs: une seule petite tache noire à la ptéropleure. Tarse I simple. Tibia II à ciliation ventrale de longueur uniforme sur les 2/3 basilaires. Tarse III: article 2 avec 2 prolongements chètiformes a l'apex. (FORMOSE) ..... *glaucus* Beck.
Flancs: outre la petite tache sur la ptéropleure, une autre plus grande sur la mesopleure. Tarse I: articles 1 et 2 ciliés à la face ventrale. Tibia II, ciliation ventrale très courte sur le tiers médian. Tarse III: article 2 à l'apex avec un seul prolongement chètiforme. (FORMOSE) ..... *obscuratus* Beck.
18. Protarse II bien plus court que l'article suivant 19
Non 29
19. Hanche I avec un robuste ergot apical. (MARQUISE) *scurra* Par.
Non 20
20. Antennes noires 21
Antennes jaunes au moins à la base 22
21. Tibia II, face ventrale, peu avant l'apex, avec une large apophyse crochue. Femur III à longue ciliation ventrale. (MOLOKAI) *ridiculus* Par.
Tibia II, face ventrale, peu avant l'apex avec un petit crochet. Femur III sans ciliation ventrale. (OAHU) ..... *brevipes* V.D.
22. Protarse II muni à l'apex d'un lobe membraneux 23
Protarse II a l'apex avec un simple ergot 24
23. Tibia II à l'apex, aplati membraneux. (HAWAII) *distortipes* Grimshaw
Non ..... *membranilobus* n. sp.
24. Chètes thoraciques jaunes. Tibia II épaissi dans le tiers apical. (OAHU) ..... *congregatus* Malloch
Chètes thoraciques noirs 25
25. Tibia II non renflé et présentant une série reguliére de chètes 26
Tibia II, au moins en partie, renflé élargi, sans hérie regulière de chètes 27
26. Patte II: femur, face ventrale, à chètes courts; tibia avec une série réguliére de chètes à la face dorsale; protarse muni à l'apex d'un ergot érigé. (MOLOKAI) ..... *calcaratus* Grimshaw

Patte II: femur, face ventrale, à chètes longs, tibia avec une série reguliére de chètes à la face ventrale; protarse avec un ergot couché, égal au 2/3 de l'article suivant. (MOLOKAI) ..... *putillus* Par.

27. Tarse I, article 3 presque 2 fois aussi long que l'article 2. Tibia II très long, aplati membraneux, longuement cilié sur les deux bords; protarse égal a la moitié de l'article suivant. (OAHU) *planitibia* n. sp.

Tarse I article 3 semsiblement égal à 2. Tibia II de longueur normale, non aplati membraneux; son protarse égal au quart de l'article suivant 28

28. Patte II: femur, face ventrale, inerme à la base; sur la moitié apicale, muni de chètes dont certains longs comme le travers. Tibia régulièrement renflé fusiforme; face posterieure, vers le milieu avec une plage dense de sétules noirs formant tache; face dorsale sans chètes basilaires; protarse à ergot long. (OAHU) ..... *vafellus* n. sp.

Patte II: femur, face ventrale, à la base, avec 2 chètes longs, jumelés; en dehors de là, chètes très courts. Tibia épaissi sur les 2/3 basilaires; un chète dorsal basilaire; face postérieure, pas de plage dense de sétules noirs; protarse à ergot court et arqué. (OAHU) *nigroanalis* n. sp.

29. Corps vert brilliant. (OAHU) ..... *ornatus* V.D.

Corps jaune brun ou vert sombre 30

30. Tibia II élargi ou épaissi. Antennes noires 31

Tibia normal ou légérement et partiellement épaissi 32

31. Tibia II, face ventrale, avec, séparées par une excavation, 2 apophyses dont l'une presque basilaire portant une appendice foliacé. (MOLOKAI) ..... *contortus* Par.

Non. (OAHU) ..... *ciliatus* V.D.

32. Tibia II avec une series reguliere de chètes tronqués à l'apex 33

Non 36

33. Antennes en partie jaunes. Tibias jaunes. Tibia II, face dorsale, au tiers basilaire, avec 2 chètes jumelés, les chètes tronqués plus courts que le travers 34

Antennes noires. Tibias en grande partie noirs. Tibia II face dorsale, sans chètes basilaires jumelés, les chètes tronqués longs et s'etendant au moins aux 2/3 basilaires 35

34. Tibia I avec au moins un chète dorsal. Femur II, face ventrale, sur le tiers médian, avec 6-7 chètes presque aussi longs que le travers, suivis d'un peigne de chètes courts; tibia, face anterieure, sur le tiers médian, sans ciliation remarquable. (OAHU) ..... *miser* n. sp.

Tibia I sans chète dorsal. Patte II; femur, face ventrale, aprés une série de 5-6 chètes, sans peigne de chètes plus courts; tibia, face antérieure, sur le tiers médian, avec une ciliation plus longue que le travers. (OAHU) ..... *depauperatus* n. sp.

35. Femur I, face ventrale, avec une série de chètes noirs. Patte II: femur d'épasseur normale; face ventrale, sans série de chètes longs parmi plusieurs séries d'épines courtes; protarse 2 fois aussi longs que l'article suivant. Tibia III face ventrale, avec des longues soies fines sur le tiers apical. Section apicale de la 5è nervure longitudinale 2 fois aussi longue que la transverse posterieure. Hypopyge relativement peu developpé. (HAWAII) ..... *tibialis* V.D.

Femur I, face ventrale, à pilosité claire, folle. Patte II: femur très épais; face ventrale, avec une série de chètes longs, parmi plusieurs séries d'épines courtes; protarse 1 fois ½ aussi long que l'article 2. Tibia III avec de longues soies fines réparties sur toute sa longueur. Section apicale de la 5è, 1 fois ½ aussi longue que la transverse postérieure. Hypopyge rélativement très développé. (OAHU) *bicoloripes* Par.

36. Antennes jaunes, au moins à la base 37

Antennes entièrement noires 53
37. Tibia II, face dorsale, avec 4 chètes robustes; face ventrale, une série de 10 soies chètiformes. (HAWAII) ..... *fimbriatus* Grimshaw
Tibia II, face dorsale, avec au plus 3 chètes 38
38. Tibia II, face dorsale, avec 2 chètes basilaires 39
Tibia II, face dorsale, avec au plus un chète basilaire 41
39. Patte II: femur inerme à la face ventrale, tibia, face dorsale, outre les deux chètes basilaires avec un chète médian et sans chètes tronqués. (HAWAII) ..... *divergens* V.D.
Patte II: femur épineux à la face ventrale, tibia sans chète dorsal médian et avec, à la face ventrale, une série de chètes tronqués ... 40
40. Tibia I, au moins un chète dorsal. Patte II: femur, face ventrale, sur le tiers médian, avec 6–7 chètes presque aussi longs que la travers, suivis d'un peigne de chètes courts; tibia, face antérieure, sur le tiers médian, sans ciliation remarquable. (OAHU) ..... *miser* n. sp.
Tibia I sans chète dorsal. Patte II: femur, face ventrale, après une série de 5–6 chètes, sans peigne de chètes courts; tibia, face antérieure, sur le tiers median, avec une ciliation plus longue que le travers. (OAHU) ..... *depauperatus* n. sp.
41. Chètes thoraciques jaunâtres. (OAHU) ..... *inermipes* Malloch
Chètes thoraciques noirs 42
42. Tibia II sinueux. (OAHU) ..... *flexuosus* n. sp.
Tibia II non sinueux 43
43. Protarse II au plus égal à l'article suivant. (OAHU) *rectus* Malloch
Protarse II nettement plus long que l'article suivant 44
44. Tibia II avec un chète dorsal basilaire 45
Tibia II sans chète dorsal basilaire, souvent avec une ciliation remarquable 46
45. Tarse I; protarse arqué, l'article 3 plus long que 2. Femur III entièrement jaune. Quatre d.c. (OAHU) ..... *flavicornis* V.D.
Tarse I: protarse droit, article 3 égal à 2. Femur III brun sur la moitié apicale. Trois d.c. (OAHU) ..... *deficiens* n. sp.
46. Tarse I article 3 nettement plus long que 2 47
Tarse I: article au plus aussi long que 2 48
47. Tibia II et son protarse, face antérieure, tout au long, longuement ciliés. (OAHU) ..... *longiciliatus* n. sp.
Tibia II et son protarse non ciliés. (OAHU) ..... *fragilis* n. sp.
48. Tibia I avec un chète dorsal. Tibia II à ciliation très longue 49
Tibia I sans chète dorsal. Tibia II à ciliation courte 50
49. Taille: 3.5 mm. Quatre a 5 d.c. Ailes fortement brunies. (OAHU) *fumipennis* Par.
Taille: 1.75 mm. Trois d.c. Ailes uniformement grisâtres. (OAHU) *aculticornis* n. sp.
50. Tibia II, muni d'un chète dorsal. (OAHU) ..... *breviciliatus* n. sp.
Tibia II sans chète dorsal 51
51. Tarse II: tous les articles à ciliation fine, espacée, à éléments crochus a l'apex. (OAHU) ..... *tarsiciliatus* n. sp.
Non 52
52. Transverse postérieure nimbée de brun. Tibia II, face postérieure, sur le 2/3 basilaires, à ciliation noire, épaisse, très dense disposée obliquement. (OAHU) ..... *macula* n. sp.
Transverse postérieure sans nimbé brun. Tibia II face dorsale avec une ciliation pale et fine. (OAHU) ..... *furax* n. sp.
53. Tibia II, face dorsale, avec 7 chètes en deux séries 54
Tibia II, face dorsale avec 3–4 chètes 55
54. Tibia I sans chète dorsal. (OAHU) ..... *concavus* V.D.
Tibia I avec un chète dorsal. (HAWAII) ..... *spinitibia* V.D.

55. Tibia I, face ventrale, sur le tiers médian, avec 2 chètes robustes. (OAHU) ..... *octosetosus* V.D.
Tibia I, face ventrale, avec un seul chète robuste. (OAHU) *obtusus* V.D.
56. Hanches II et III noires. Femurs noirs à l'apex, tibias et tarses entiérement noirs. (MOLOKAI) ..... *simplicipes* n. sp.
Hanches et pattes jaunes, tout au plus le femur III noir à l'apex ... 57
57. Femur III noir à l'apex 58
Femur III entierement jaune 60
58. Quatre à cinq d.c. Une série d'acrosticaux. Balanciers jaunes. Article 3 des antennes obtus à l'apex. (FORMOSE) *maculatus* Beck
Trois d.c. Pas d'acrosticaux. Balanciers noirs. Article 3 des antennes trianguliare aigu 59
59. Femur III muni de soies à la face ventrale. Balanciers jaunes. (OAHU) ..... *deficiens* n. sp.
Femur III nu à la face ventrale. Balanciers noirs. (OAHU) *olympicola* n. sp.
60. Nervures longitudinales 3 et 4 parallèles. (FORMOSE) *lucidus* Beck
Nervures longitudinales 3 et 4 divergentes. (I. PHILIPPINES) *rufinus* Frey

Remarque. Comme on peu le voir par la table précédente, l'archipel Hawaiien se montre remarquablement riche en espèces de *Campsicnemus*. Sur 57 espèces connues de la region Indo-Australienne, il en abrite 50 à lui seul (OAHU: 35,–HAWAII: 8,–MOLOKAI: 6,–KAUAI: 1)

Mais ce qui est plus remarquable et conforme d'ailleurs à ce que l'on sait de la faune de l'Archipel, toutes les espèces sont endemiques et toutes, au moins à ma connaissance, sont propres à l'une ou l'autre des des differentes iles.

Genre EURYNOGASTER Van Duzee[1]

1. E. apicenigra n. sp. (fig. 20).

Male. Front bleu d'acier brilliant. Face noire brilliante. Cils postoculaires inférieurs noirs. Antennes noires; article 3 aussi long que large, soie simple, presque basilaire. Corps vert bleu brilliant, 5 d.c. pas d'acrosticales, 2 scutellaires, 1 prothoracique. Abdomen, segment 4 saillant ventralement; hypopyge encastré. Hanche I entièrement jaune, à vestiture noire, II et III noires, III sans chète externe. Trochanters et pattes jaunes, femur III brun sur le quart apical, tarses I et II noirs à partir de l'apex du protarse; III entièrement. Patte I: tibia, 2 chètes dorsaux, tarse 1 fois ¼ aussis long que le tibia, les articles de longueur régulièrement décroissante; protarse sensiblemment égal aux deux articles suivants réunis. Patte II (fig. 20): femur, pas de préapical; face ventrale sur la moitie basilaire avec 5–6 soies fines, rigides, érigées, aussi longues que le travers. Tibia face dorsale, 2 antérieurs, 2 postérieurs; face ventrale, tout au long, une ciliation irrégulière, fine, inclinée, 1 fois ½ aussi longue que le travers. Patte III simple, femur un préapical; protarse un peu plus long que l'article suivant. Ailes grisâtres, 4è longitudinale à section apicale légérement plus courte que la basilaire mesurée à partir la transverse basilaire; transverse postérieure

[1] With Abbé Parent's consent I have made a few corrections in the text.—Francis X. Williams.

égale à la section apicale de la 5è. Balanciers jaune pale. Cuillerons noirs à cils noirs. Long: 2.25 mm.
Female semblable au male.

OAHU: Mt. Kaala, 3000 ft.; Punaluu Uplands, dripping bank.

2. E. binodata n. sp. (figs. 21–23).

Male. Front et face bleu d'acier brillant malgré un poudré brun noir. Face à peine, élargie vers l'apex, large comme les 2/3 d'un travers d'oeil. Cils postoculaires inférieurs noirs. Antennes noires, l'article 3 guère plus long que large, comme tronqué à l'apex soie simple, insérée un peu avant le milieu. Corps entièrement vert bleu métallique trés brillant, 5 d.c. pas d'acrosticaux, 1 prothoracique fin, 2 scutellaires. Segment 4 de l'abdomen avec un prolongement ventral en forme de fer de lance. Hypopyge (fig. 21) encastré. Pattes entièrement vert métallique, hanche I à vestiture noire, III à chète externe trés faible. Patte I: femur face ventrale, tout au long, une série de 10 soies fines érigées, longues comme le travers, tarse plus court que le tibia; protarse égal aux 4 articles suivants réunis, ceux-ci sensiblement égaux entre eux. Patte II (fig. 22): femur, un préapical; tibia, face dorsale, 2 antérieurs, 2 postérieurs; face ventrale, un épaississement au tiers basilaire, un autre au quart apical, celui-ci portant une pinceau dense de soies longues comme le travers. Protarse arqué muni d'une brosse de poils prés de la base ventrale. Patte III simple, protarse un peu plus long que l'article suivant. Ailes (fig. 23) teintées de brun plus fortement au bord antérieur; 4è longitudinale à section apicale plus courte que la basilaire mesurée à partir de la transverse basilaire. Transverse posterieure au moins 2 fois aussi longue que la section apical de la 5è. Balanciers noirs. Cuillerons noirs à cils noirs. Longueur: 2.55 mm.
Female semblable au male, à part l'ornementation des pattes.

OAHU: Kaluanui stream, 2000 ft., steep wet shaded rocks, "uncommon, local and difficult to catch."

3. E. cilifemorata n. sp. (figs. 24 et 25).

Male. Front terni par un poudré. Face à satiné blanc. Cils postoculaires inférieurs noirs. Antennes (fig. 24) noires, l'article 3 de peu mais nettement plus long que large, ogival; soie simple, subapicale. Mesonotum cuivreux au fond, complètement terni par un poudré gris, cuivreux par places; 5 d.c.; pas d'acrosticales, ni de prothoracique. Abdomen vert bronzé, peu brillant, à vestiture noire, le segment 4 saillant à la face ventrale. Hypopyge encastré. Hanches noires, I jaunâtre par places, III avec un chète externe noir. Trochanters jaunâtres. Femurs jaunes, I et II noircis à la face dorsale, III aux faces dorsale et ventrale; tibias jaunes, III bruni sur sa moitié apicale, tarses noirs à partir de l'apex du protarse. Patte I: femur nu; tibia avec un chète ventral au tiers basilaire; tarse 1 fois 1/3 aussi long que le tibia; protarse nettement plus long que le reste, les autres articles de longueur régulièrement décroissante. Patte II (fig. 25): femur, un préapical; face ventrale, sur le tiers médian avec un peigne d'épines inclinées vers l'apex, la première plus longue et plus robuste; tibia, face dorsale, 1 chéte postérieur au quart basilaire; un anterieur au milieu; face ventrale, ligne antérieure, sur la moitié basilaire, une série de 5 longues soies. Patte III: femur, 1 préapical; face ventrale, sur la moitié basilaire, une série de 5 longues soies fines, érigées, longues au moins comme le travers. Tibia, 4 chètes dorsaux, inclinés, sans aucune ciliation. Protarse égal à l'article suivant. Ailes brunâtres, section basilaire de la 4è longitudinale mesurée à partir de la transverse basilaire, nettement plus longue

55. Tibia I, face ventrale, sur le tiers médian, avec 2 chètes robustes. (OAHU) ..... *octosetosus* V.D.
Tibia I, face ventrale, avec un seul chète robuste. (OAHU) *obtusus* V.D.

56. Hanches II et III noires. Femurs noirs à l'apex, tibias et tarses entiérement noirs. (MOLOKAI) ..... *simplicipes* n. sp.
Hanches et pattes jaunes, tout au plus le femur III noir à l'apex ... 57

57. Femur III noir à l'apex 58
Femur III entierement jaune 60

58. Quatre à cinq d.c. Une série d'acrosticaux. Balanciers jaunes. Article 3 des antennes obtus à l'apex. (FORMOSE) *maculatus* Beck
Trois d.c. Pas d'acrosticaux. Balanciers noirs. Article 3 des antennes trianguliare aigu 59

59. Femur III muni de soies à la face ventrale. Balanciers jaunes. (OAHU) ..... *deficiens* n. sp.
Femur III nu à la face ventrale. Balanciers noirs. (OAHU) *olympicola* n. sp.

60. Nervures longitudinales 3 et 4 parallèles. (FORMOSE) *lucidus* Beck
Nervures longitudinales 3 et 4 divergentes. (I. PHILIPPINES) *rufinus* Frey

Remarque. Comme on peu le voir par la table précédente, l'archipel Hawaiien se montre remarquablement riche en espèces de *Campsicnemus*. Sur 57 espèces connues de la region Indo-Australienne, il en abrite 50 à lui seul (OAHU: 35,–HAWAII: 8,–MOLOKAI: 6,–KAUAI: 1)

Mais ce qui est plus remarquable et conforme d'ailleurs à ce que l'on sait de la faune de l'Archipel, toutes les espèces sont endemiques et toutes, au moins à ma connaissance, sont propres à l'une ou l'autre des des differentes iles.

Genre EURYNOGASTER Van Duzee[1]

1. E. apicenigra n. sp. (fig. 20).

Male. Front bleu d'acier brilliant. Face noire brilliante. Cils postoculaires inférieurs noirs. Antennes noires; article 3 aussi long que large, soie simple, presque basilaire. Corps vert bleu brilliant, 5 d.c. pas d'acrosticales, 2 scutellaires, 1 prothoracique. Abdomen, segment 4 saillant ventralement; hypopyge encastré. Hanche I entièrement jaune, à vestiture noire, II et III noires, III sans chète externe. Trochanters et pattes jaunes, femur III brun sur le quart apical, tarses I et II noirs à partir de l'apex du protarse; III entièrement. Patte I: tibia, 2 chètes dorsaux, tarse 1 fois ¾ aussis long que le tibia, les articles de longueur régulièrement décroissante; protarse sensiblemment égal aux deux articles suivants réunis. Patte II (fig. 20): femur, pas de préapical; face ventrale sur la moitie basilaire avec 5–6 soies fines, rigides, érigées, aussi longues que le travers. Tibia face dorsale, 2 antérieurs, 2 postérieurs; face ventrale, tout au long, une ciliation irrégulière, fine, inclinée, 1 fois ½ aussi longue que le travers. Patte III simple, femur un préapical; protarse un peu plus long que l'article suivant. Ailes grisâtres, 4è longitudinale à section apicale légérement plus courte que la basilaire mesurée à partir la transverse basilaire; transverse postérieure

[1] With Abbé Parent's consent I have made a few corrections in the text.—Francis X. Williams.

égale à la section apicale de la 5è. Balanciers jaune pale. Cuillerons noirs à cils noirs. Long: 2.25 mm.

Female semblable au male.

OAHU: Mt. Kaala, 3000 ft.; Punaluu Uplands, dripping bank.

2. E. binodata n. sp. (figs. 21–23).

Male. Front et face bleu d'acier brillant malgré un poudré brun noir. Face à peine, élargie vers l'apex, large comme les 2/3 d'un travers d'oeil. Cils postoculaires inférieurs noirs. Antennes noires, l'article 3 guère plus long que large, comme tronqué à l'apex soie simple, insérée un peu avant le milieu. Corps entièrement vert bleu métallique trés brillant, 5 d.c. pas d'acrosticaux, 1 prothoracique fin, 2 scutellaires. Segment 4 de l'abdomen avec un prolongement ventral en forme de fer de lance. Hypopyge (fig. 21) encastré. Pattes entièrement vert métallique, hanche I à vestiture noire, III à chète externe trés faible. Patte I: femur face ventrale, tout au long, une série de 10 soies fines érigées, longues comme le travers, tarse plus court que le tibia; protarse égal aux 4 articles suivants réunis, ceux-ci sensiblement égaux entre eux. Patte II (fig. 22): femur, un préapical; tibia, face dorsale, 2 antérieurs, 2 postérieurs; face ventrale, un épaississement au tiers basilaire, un autre au quart apical, celui-ci portant une pinceau dense de soies longues comme le travers. Protarse arqué muni d'une brosse de poils prés de la base ventrale. Patte III simple, protarse un peu plus long que l'article suivant. Ailes (fig. 23) teintées de brun plus fortement au bord antérieur; 4è longitudinale à section apicale plus courte que la basilaire mesurée à partir de la transverse basilaire. Transverse posterieure au moins 2 fois aussi longue que la section apical de la 5è. Balanciers noirs. Cuillerons noirs à cils noirs. Longueur: 2.55 mm.

Female semblable au male, à part l'ornementation des pattes.

OAHU: Kaluanui stream, 2000 ft., steep wet shaded rocks, "uncommon, local and difficult to catch."

3. E. cilifemorata n. sp. (figs. 24 et 25).

Male. Front terni par un poudré. Face à satiné blanc. Cils postoculaires inférieurs noirs. Antennes (fig. 24) noires, l'article 3 de peu mais nettement plus long que large, ogival; soie simple, subapicale. Mesonotum cuivreux au fond, complètement terni par un poudré gris, cuivreux par places; 5 d.c.; pas d'acrosticales, ni de prothoracique. Abdomen vert bronzé, peu brillant, à vestiture noire, le segment 4 saillant à la face ventrale. Hypopyge encastré. Hanches noires, I jaunâtre par places, III avec un chète externe noir. Trochanters jaunâtres. Femurs jaunes, I et II noircis à la face dorsale, III aux faces dorsale et ventrale; tibias jaunes, III bruni sur sa moitié apicale, tarses noirs à partir de l'apex du protarse. Patte I: femur nu; tibia avec un chète ventral au tiers basilaire; tarse 1 fois 1/3 aussi long que le tibia; protarse nettement plus long que le reste, les autres articles de longueur régulièrement décroissante. Patte II (fig. 25): femur, un préapical; face ventrale, sur le tiers médian avec un peigne d'épines inclinées vers l'apex, la première plus longue et plus robuste; tibia, face dorsale, 1 chéte postérieur au quart basilaire; un anterieur au milieu; face ventrale, ligne antérieure, sur la moitié basilaire, une série de 5 longues soies. Patte III: femur, 1 préapical; face ventrale, sur la moitié basilaire, une série de 5 longues soies fines, érigées, longues au moins comme le travers. Tibia, 4 chètes dorsaux, inclinés, sans aucune ciliation. Protarse égal à l'article suivant. Ailes brunâtres, section basilaire de la 4è longitudinale mesurée à partir de la transverse basilaire, nettement plus longue

que l'apicale; transverse postérieure de peu mais nettement plus longue que la section apicale de la 5è. Balanciers à capitule brun. Cuillerons noirs à cils noirs. Long: 1.75 mm.

Femelle. A part l'ornementation des pattes, semblable au male, en particulier soie subapical, face blanche, balanciers bruns.

OAHU: Olympus trail, 2400 ft., Oct. "foliage"; Konahuanui, 2700 ft., Nov.; Lulumahu stream, 1900 ft., Sept. "slopes of valley."

4. E. luteihalterata n. sp. (figs. 27 et 28).

Male. Front et face vert métallique trés brillant. Antennes noires, l'article 3 au plus aussi long que large; soie simple dorsale. Corps entièrement vert métallique brillant, 5 d.c., pas d'acrosticales, 2 scutellaires, un prothoracique. Abdomen à segment 4 saillant ventralement. Hypopyge (fig. 27) presque libre. Hanches noires, III avec un chète externe faible. Trochanters jaune rouge. Pattes vert métallique. Patte I: femur, face ventrale, moitié apicale avec une série d'épines robustes un peu plus courtes que le demi-travers; tibia sans chète, tarse à peine aussi long que le tibia, protarse égal au reste les autres articles sensiblement égaux entre eux. Patte II: femur avec un préapical; face ventrale, avec quelques épines à l'état de pointements. Tibia, face dorsale, 2 antérieurs, 2 postérieurs. Patte III: femur, 2 préapicaux espacés; face ventrale ligne antérieure, moitié apicale, avec une série d'épines fines et courtes. Protarse un peu plus long que l'article suivant. Ailes (fig. 28) teintées de brunâtre, section apicale de la 4è bien plus longue que la basilaire mesurée à partir de la transverse basilaire; transverse posterieure au moins aussi longue que la section apicale de la 5è. Balanciers jaune clair. Cuillerons noirs à cils noirs. Long: 2.75 mm.

Female semblable au male, en particulier: femur I épineux ventralement, protarse I égal aux autres articles réunis.

OAHU: Mt. Kaala, 3600 ft., "wet bank," Sept.

5. E. maculata n. sp. (figs. 29 et 30).

Male. Front terni par un poudré brun. Face à satiné blanc, atteignant le niveau inférieur des yeux. Cils postoculaires inférieures noirs. Antennes noires, l'article 3 presque 1 fois ½ aussi long que large, conique; soie subapicale, simple. Mesonotum bronzé, terni par un poudré roux cuivreux, 5 d.c. pas d'acrosticaux, un prothoracique trés faible, 2 scutellaires. Abdomen vert cuivreux assez brillant, à vestiture noire, segment 4 saillant ventralement. Hypopyge encastré. Hanches noires, III avec un chète externe noir. Trochanters I jaunâtres, II et III jaunes. Femurs bronzés, étroitement jaunes à l'apex, tibias jaunes, III noir sur la moitié apicale; tarses jaunes, noirs à partir de l'apex du protarse. Patte I: femur et tibia inermes, tibia, face dorsale, un chète minuscule au quart basilaire; tarse un peu plus long que le tibia, protarse plus court qur le reste, les 4 derniers articles de même longueur. Patte II (fig. 29): femur, un préapical; face ventrale, sur le tiers basilaire, une série trés serrée d'épines noires, épaisses, les deux premières plus longues et pointues, les autres tronquées à l'apex; à la suite, un groupe de 4–5 chètes formant peigne. Tibia, face dorsale, 1 chète au tiers basilaire; face ventrale, renflé à l'apex, et présentant vers le milieu une série de 3 longues soies arquées. Patte III: femur, un préapical; tibia progressivement élargi vers l'apex, protarse à peine plus long que l'article suivant. Ailes (fig. 30) avec une tache brune à l'apex. Balanciers jaune clair. Cuillerons noirs à cils noirs. Long: 2.5 mm.

Femelle semblable au male à part l'ornementation des pattes en particulier soie subapicale.

OAHU: Mt. Kaala, "near spring," 3600 ft., Sept.; Koolau Summit Trail, 2800 ft., Nov.; Konahuanui, 2750 ft., Nov.; Lulumahu Stream, 1900 ft.

6. E. minor Parent.* (*Paraliancalus*) 1937, Konowia, Bd. XVI, Heft 3/4, p. 213 (figs. 31–34).

Male. Front et face vert métallique très brillant. Cils postoculaires inférieurs noirs. Antennes (fig. 31) noires, l'article 3 au moins 1 fois ½ aussi long que large à la base; soie insérée avant le milieu, épaisse jusqu'au bout où elle est un peu dilatée. Corps entièrement bleu d'acier brillant, 5 d.c. pas d'acrosticaux, 2 scutellaires un prothoracique fin. Abdomen à segment 4 saillant ventralement. Hypopyge (fig. 32) encastré, bien courbé. Pattes entièrement vert métallique. Hanche I pratiquement glabre, avec quelques soies noires à l'apex, III sans chète externe. Patte I (fig. 33): fémur, face ventrale, une ciliation fine, longue comme la moitié du travers. Tibia, face ventrale, à cils fins, longs comme le demi-travers; face dorsale avec des chètes trés réduits; protarse, face ventrale, une ciliation longue comme le travers. Patte II (fig. 34): fémur, pas de préapical anterieur; face ventrale, une ciliation grossière, plus courte que le demi-travers, devenant plus longue et très dense à l'apex. Tibia, face ventrale, une ciliation fine, érigée très courte, chétes dorsaux très faibles. Patte III: fémur, 2 preapicaux; protarse 1 fois ½ aussi long que l'article suivant. A toutes les pattes griffes très développées. Ailes grisâtres; transverse posterieure plus longue que la section apicale de la 5è. Balanciers jaunes. Cuillerons noirs à cils noirs. Long: 4 mm.

Femelle déjà décrite, semblable au male, en particulier à soie antennaire épaisse jusqu'au bout.

OAHU: Mt. Kaala, 3600 ft., "wet bank," Sept.

Remarque. J'ai été amené à ranger dans le genre *Eurynogaster,* la forme que j'avais décrite sous le nom de *Paraliancalus minor,* bien que cette derniére espèce soit un peu aberrante dans ce genre.

7. E. nigrohalterata n. sp. (figs. 35–37).

Male. Front violacé brillant. Face vert métallique brillant, à division transversale très saillante. Palpes et trompe noirs. Cils postoculaires inférieurs noirs. Antennes noires, l'article 3 cintré, plus large que long; soie presque basilaire, simple. Mesonotum violet très brillant; 5 d.c. pas d'acrosticaux, un prothoracique noir. Abdomen (fig. 35) vert, varié de violacé pourpre, brillant, à vestiture noire, à segment 4 prolongé ventralement en forme de fer de lance. Hypopyge encastré. Pattes noir vert brillant, à part les trochanters qui sont jaune, pale. Hanche I à vestiture noire, la pilositié fine et clairsemée; III sans soie externe. Patte I (fig. 36), femur, face ventrale, sur les 3/5 apicaux, avec un peigne d'épines robustes, un peu plus courtes que le travers. Tibia, face ventrale, tout au long, avec une série de chètes délicats; face dorsale, avec 2 chètes courts et délicats; tarse un peu plus long que le tibia, protarse égal au reste, les derniers articles sensiblement égaux, les 3 derniers articles, surtout l'article 3, avec quelques soies longues à la face dorsale. Patte II: femur nu à la face ventrale; un préapical. Tibia, face ventrale, légèrement épaissi au tiers basilaire et, peu avant l'apex, sur les 2/3 apicaux, avec une ciliation égale, fine, courte; face dorsale, 3 chètes dont les deux premiers faisant paire prés de la racine; 1 chète anterieur. Patte III: femur pratiquement nu à la face ventrale; 2 préapicaux. Tibia, face dorsale, 4 chètes antérieures, 1 postérieur. Protarse à peine plus long que l'article suivant. Ailes (fig. 37) brunâtres, section apicale de la 4è un peu plus longue que la basilaire

mesurée à partir de la transverse basilaire; transverse postérieure égale à la section apicale de la 5è. Balanciers noirs. Cuillerons noirs à cils noirs. Long: 3 mm.

Femelle sembable au male en particulier avec le même peigne d'épines au femur I et avec les balanciers noirs.

OAHU: Mt. Kaala, 3600 ft., "wet bank," Sept.

8. E. obscurifacies n. sp. (figs. 38 et 26).*

Male. Front et face ternis par un poudré brun chocolat. Cils postoculaires inférieurs noirs. Antennes noires, l'article 3 plus large que long; soie simple, dorsale. Mesonotum vert brillant malgré un poudré brun rouille assez épais, 5 d.c., pas d'crosticaux, 2 scutellaires, 1 prothoracique noir. Abdomen vert métallique assez brillant, segments 3 et 4 un peu saillants ventralement. Hypopyge encastré. Pattes vert métallique à part les trochanters jaunes. Hanche III sans chète externe. Patte I (fig. 38): femur, face ventrale, sur le 3è quart, avec une série dense d'épines à l'état de pointements. Tibia, face dorsale, 2 chètes minuscules; face ventrale, tout au long, avec une série dense d'épines fines, très courtes; tarse 1 fois 1/3 aussi long que le tibia; protarse égal au reste, les articles 2, 3 et 4 sensiblement égaux. Patte II: femur, pas de preapical; face ventrale sur la moitié apicale, avec une spinulation serrée, courte, à l'état de pointements. Patte III: femur, un préapical; protarse de peu, mais nettement plus long que l'article suivant. Ailes teintées de brun; section apicale de la 4è plus longue que la basilaire mesurée à partir de transverse basilaire; transverse postérieure au plus égale à la section apicale de la 5è. Balanciers noirs. Cuillerons noirs, à cils noirs. Long: 2.75 mm.

Femelle (fig. 26) assez semblable au male.

OAHU: Mt. Kaala, 3600 ft., "wet bank."

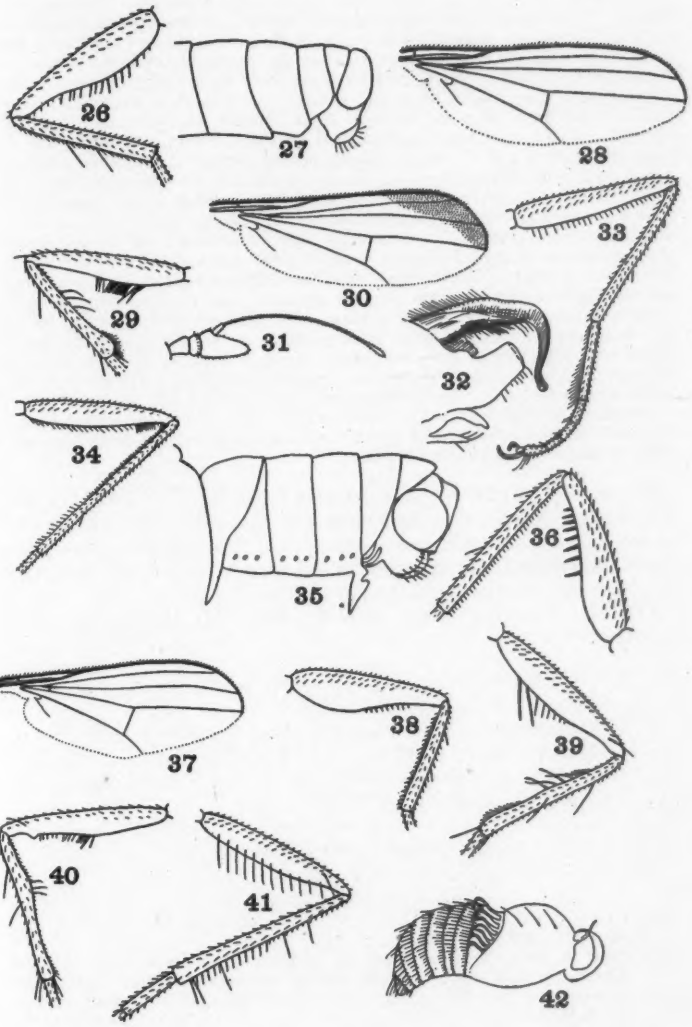
9. E. retrociliata n. sp. (figs. 40 et 41).*

Male. Front terni par un poudré. Face à satiné blanc. Cils postoculaires noirs. Antennes noires, article 3 un peu plus large que long; soie simple, insérée au milieu du bord dorsal. Mesonotum entièrement terni par un poudré fauve cuivreux, 5 d.c., pas d'acrosticaux, 2 scutellaires, 1

DOLICHOPODIDAE

Planche XIII

26. *Eurynogaster obscurifacies* ♀, patte I.
27. " *luteihalterata* ♂, hypopyge.
28. " " aile.
29. " *maculata* ♂, patte II.
30. " " ♂, aile.
31. " *minor* ♂, antenne.
32. " " ♂, hypopyge.
33. " " ♂, patte I.
34. " " ♂, patte II.
35. " *nigrohalterata* ♂, abdomen.
36. " " ♂, patte I.
37. " " ♂, aile.
38. " *obscurifacies* ♂, patte I.
39. " *clavaticauda* ♂, patte II.
40. " *retrociliata* ♂, patte II.
41. " " ♂, patte III.
42. *Asyndetus carcinophilus* Par. Exuvie.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prothoracique fin. Abdomen vert sombre, peu brillant, à vestiture noire, à segment 4 peu saillant ventralement. Hypopyge encastré. Hanches noires, I à vestiture noire, III avec un chète externe noir, robuste. Trochanters jaunes. Pattes jaunes, les femurs I et II noirs à la face dorsale, III noirs sur les 3/5 medians, tibia III noir sur le quart apical; tarses I et II avec les derniers articles noircis, III noir à partir de l'apex du protarse. Patte I: femur nu à la face ventrale, tibia avec un chète dorsal long au tiers basilaire; tarse 1 fois ½ aussi long que le tibia, protarse nettement plus court que le reste, les articles de longueur regulièrement décroissante. Patte II (fig. 40): femur, avec un préapical; face ventrale, sur les cinquièmes 3 et 4, avec une série dense de chètes épines, presque aussi longs que le travers. Tibia avec deux chètes dorsaux; face ventrale un peu épaissi à l'apex et sur le 2è quart à partir de la racine, le dernier épaississement muni d'une série de 5 soies grossières, longues comme le travers. Patte III (fig. 41): femur avec un préapical; face ventrale, ligne anterieure, sur les 2/3 basilaires, avec une série de 6–7 soies fines, érigées, plus longues que le travers. Tibia face dorsale, 5 chètes dont 2 apicaux, tous longs, fins, érigés; face dorsale, ligne anterieure, sur les 2/3 apicaux, une ciliation remarquable, égale, érigée longue comme le travers. Protarse de peu mais nettement plus long que l'article 2. Ailes teintées de brun, section apicale de la 4è légèrement plus longue que la basilaire mesurée à partir de la transverse basilaire; transverse postérieure plus longue que la section apicale de la 5è. Balanciers jaune clair. Cuillerons noirs à cils noirs. Long: 2 mm.

Femelle. Sembable au male, cependant les femurs plus largement bruns, et, seul exemple connu dans ce genre, face autrement colorée, brun cuivreux alors qu'elle est blanche chez le male.

Remarque. Cette espèce ressemble beaucoup à *E. cilifemorata.* Elle s'en distingue, non seulement par la couleur des balanciers, jaune clair et non brun noir, mais encore par des caractères plastiques importants: soies ventrales du tibia II plus courtes, chetes érigés et une ciliation remarquable au tibia III, etc.

OAHU: Tantalus Crater, 1800 ft., Aug.; Mt. Kaala, trail, 1800 ft., Aug.

10. **E. viridifacies** Par. OAHU: Mt. Kaala, spring, 3600 ft., Sept.; Punaluu Uplands, Oct.
11. **E. clavaticauda** V.D. (fig. 39, patte II, ♂). OAHU: Lulumahu Valley, 1900 ft., Oct.; Punaluu Valley, 1800–2000 ft., Nov.; Olympus, 2400 ft., Oct.; Konahuanui Trail, Sept.; Mt. Kaala, trail, 1800 ft., Aug.

TABLE DES ESPÈCES

Males

1. Balanciers noirs 2
   Balanciers jaunes 5
2. Femur I, face ventrale, muni de longues soies fines, très espacées. Patte II: tibia, face ventrale, épaissi en deux endroits, l'épaississement distal orné d'un groupe serré de chètes courts; protarse arqué. (OAHU) ..... *binodata* n. sp.
   Femur I, face ventrale, sans longues soies fines. Patte II: tibia sans épaississement; protarse droit 3

3. Femur III à ciliation ventrale. Face blanche. (OAHU) *cilifemorata* n. sp.
   Femur III sans ciliation ventrale. Face d'une autre couleur 4
4. Segment 4 de l'abdomen prolongé ventralement en fer de lance. Face bleu d'acier brillant. (OAHU) ..... *nigrohalterata* n. sp.
   Segment 4 de l'abdomen non prolongé ventralement en fer de lance. Face ternie par un poudré brun. (OAHU) ..... *obscurifacies* n. sp.
5. Ailes tachées. (OAHU) ..... *maculata* n. sp.
   Non 6
6. Article 3 des antennes au moins 1 fois ½ aussi long que large à la base. Soie antennaire épaissie à l'apex. (OAHU) ..... *minor* Par.
   Non et non 7
7. Femur III, face ventrale, muni de longs cils fins. Tibia III, face dorsale, à chètes fins érigés; face dorsale, ligne antérieure, avec une ciliation remarquable. (OAHU) ..... *retrociliata* n. sp.
   Non, non et non 8
8. Pattes, à part les trochanters, sombres. (OAHU) *luteihalterata* n. sp.
   Au moins les tibias jaunes 9
9. Femur I, face ventrale, épineux. Face brillante métallique. (OAHU) *viridifacies* Par.
   Femur I, face ventrale, non épineux 10
10. Femur III largement noir à l'apex. Face métallique sombre. Corps métallique brillant. Hanche I entièrement et nettement jaune. (OAHU) ..... *apicenigra* n. sp.
    Femurs et tibias entièrement jaunes. Face blanche 11
11. Corps terni par un poudré ..... *clavaticauda* V.D.
    Corps metallique brillant 12
12. Hypopyge libre. Femur II, face ventrale, épineux; son tibia cilié ventralement. (HAWAII) ..... *nitida* V.D.
    Hypopyge encastré. Patte II: femur et tibia, face ventrale, sans ornementation. (OAHU) ..... *virida* V.D.

Females

1. Ailes tachées ..... *maculata* n. sp.
   Non 2
2. Corps au fond, vert sombre ou cuivreux, entièrement terni par un poudré 3
   Corps à fond bleu ou vert métallique très brillant ou au moins transparaissant sous le poudré 5
3. Femurs entièrement jaunes ..... *clavaticauda* V.D.
   Femurs en partie sombres 4
4. Balanciers noirs ..... *cilifemorata* n. sp.
   Balanciers jaunes ..... *retrociliata* n. sp.
5. Article 3 des antennes 1 fois ½ aussi long que large à la base. Soie antennaire conservant jusqu'au bout la même épaisseur .. *minor* Par.
   Article 3 des antennes pas plus long que large. Soie antennaire graduellement effilée vers l'apex 6
6. Pattes entièrement ou à part les trochanters, métalliques 7
   Au moins les tibias jaunes 10
7. Femur I, face ventrale, muni d'épines robustes. Face vert metallique brillant 8
   Femur I, face ventrale, sans épines, ou avec épines réduites à l'etat de pointements 9
8. Balanciers noirs ..... *nigrohalterata* n. sp.
   Balanciers jaunes ..... *luteihalterata* n. sp.
9. Transverse posterieure 2 fois aussi longue que la section apicale de la 5é. Face bleu d'acier brillant ..... *binodata* n. sp.

Transverse posterieure au plus égale à la section apicale de la 5è. Face ternie par un poudré brun chocolat. ..... *obscurifacies* n. sp.
10. Femur I épineux à la face ventrale. Face vert métallique brillant *viridifacies* Par.
Femur I non épineux á la face ventrale. Face d'une autre couleur 11
11. Femur III largement noir à l'apex. Face sombre métallique. (OAHU) *apicenigra* n. sp.
Tous les femurs entièrement jaunes. Face blanche 12
12. Front à poudre blanc. (OAHU) .... (*Sweziella* olim) *albifacies* V.D.
Front a poudre brun 13
13. (HAWAII) ..... *nitida* V.D.
(OAHU) ..... *virida* V.D.

Ce genre n'est connu jusqu'ici que de l'archipel Hawaiien.

II. CHRYSOSOMATINAE

Chrysosoma fraternum V.D. OAHU: Ewa Plant. Co., Ltd., Sept.; Palikea, Waianae Mts.

La femelle présente les caractères suivants: Antennes: article 3 1 fois ½ aussi long que large; article 2 avec, à l'apex, une soie dorsale presque aussi longue que l'article 3. Soie antennaire longue comme tête, thorax et écusson réunis. Mesonotum bleu violacé, abdomen vert. Hanches et trochanters noirs. Hanche I à vestiture entièrement pale. Tibia III noir à l'extrême apex. Femur I, face ventrale, avec 2 longues soies blanches (et non noires comme le dit Van Duzee). Tibia I avec 3 longues soies chètiformes à la face dorsale et 2 à la face ventrale, son protarse avec un chète dorsal aprés le milieu. Tibia II, face dorsale, avec 3 soies chètiformes; face ventrale, avec 2 chètes. Tibia III avec 3 chètes dorsaux robustes. Balanciers jaunes.

III. DIAPHORINAE

Asyndetus carcinophilus Par. (fig. 42).

OAHU: Waianae, sand-crab hole, July, 36. Beach near "blow-hole." Un exuvium ex Hanauma Bay material.

Genre CHRYSOTUS Meig

C. pallidipalpus V.D. OAHU: Manoa Valley, Honolulu, 1500 ft., July; Olympus, 1800 ft., Nov., Manoa; Waihi-iki, Manoa; Pauoa-Tantalus Trail, "wet rocks."

Remarque. Mon *C. elegans* n'est autre que *C. pallidipalpus* V.D. Chose curieuse, un mois après l'avoir decrite des iles Hawaii, j'ai reçu, de cette espèce, plusieurs exemplaires provenant des serres chaudes du Parc de la Tête d'Or de Lyon et plusieurs mois apres, d'autres capturés dans une serre particulière (de Meijere) à Amsterdam, Hollande. J'ignore encore si dans ces deux endroits l'espèce se perpétue comme c'est le cas de *Chrysosoma exsul* Par. à Lyon.

IV. DOLICHOPODINAE

Genre DOLICHOPUS Latr.

D. exsul Aldr. = *stigmatifer* Par.* comme me l'a signalé F. X. Williams et comme j'ai pu m'en convaincre moi-même en prenant connaissance de la description d'Aldrich. OAHU: Hering Valley, Tantalus, Honolulu, on wet rocks; Punaluu Uplands; Konahuanui Trail, 2000 ft.; Tantalus Trail; Mt. Kalena, Waianae Mts., 3500 ft.; Mt. Olympus, 2000 ft. HAWAII: Kohala Mts. KAUAI: Kilauea.

V. HYDROPHORINAE

Genre PARALIANCALUS Par.

P. minor Par. Par comparaison avec les nombreuses especes d'*Eurynogaster* que je viens de décrire j'ai été amené a renier le genre *Paraliancalus* et à y voir un *Eurynogaster*. Voir plus haut *Eurynogaster minor*.

Genre SWEZIELLA V.D.

D'apres F. X. Williams (in litt.) le genre *Sweziella* est basé sur une simple femelle et non un male comme le pensait Van Duzee, et le type lui parait appartenir au genre *Eurynogaster*. Par suite le genre tombe et l'espèce est reversée au genre *Eurynogaster*.

Van Duzee a range ce dernier genre parmi les *Campsicneminae*. Je l'ai suivi sans conviction. Et cette hésitation se traduit par le fait que l'auteur américain à rangé son genre *Sweziella* (= *Eurynogaster*) parmi les *Hydrophorinae*, et que moi-même j'ai rangé parmi les *Hydrophorinae* le genre *Paraliancalus* (= *Eurynogaster*). La vérité c'est que les groupes établis par Beck. n'arrivent pas à contenir dans leurs limites les nombreuses formes nouvelles décrites depuis son travail, et la prudence conseille d'attendre, pour risquer une nouvelle synthèse.

VI. RAPHIINAE

Genre SYNTORMON Lw.

S. distortitarsis V.D. OAHU: Manoa, wet rocks; Waihi-iki; Waialua, lime rock puddle edge; Honolulu (Swezey); Woodlawn, Honolulu; Punaluu Uplands; Lulumahu Valley, 1900 ft.; Pauoa-Tantalus Trail, 1600 ft.; Tantalus Trail and Crater.

On the Host Plants of Some Hawaiian Thrips[1]

BY K. SAKIMURA
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(Presented at the meeting of December 1, 1938)

Data on the host plants of Hawaiian thrips, most of which were collected on the island of Oahu excepting where otherwise specified, in 1938, are presented here as one of the writer's yearly series. Some material and data were supplied by other workers. A minor systematic survey of *Thrips nigropilosus* was undertaken.

THRIPS NIGROPILOSUS

Local population status and host range of *T. nigropilosus* have been studied in conjunction with an investigation of this species with respect to its transmitting ability of the yellow spot virus (8), which is a probable synonym of the spotted wilt virus (7).

T. nigropilosus was first described in 1895 from Bohemia (10), and its presence has since been reported from Norway, Sweden, Finland, Russia, Poland, Germany, Hungary, Rumania, Albania, England, and France. A species from Iowa described in 1896 under the name of *Thrips lactucae* Beach (1) was shown to be a synonym of the above and its probable introduction from Europe was presumed (2). It is known to be distributed in California, Washington, South Dakota, Iowa, Illinois, Michigan, and New York. This species was also reported from South Australia.[2]

T. nigropilosus, feeding on leaves, stems and also flowers, is polyphagus and voracious in its food habits. The reproductive potentials observed under confinement appeared as high as those of *Thrips tabaci.* Chrysanthemum is most commonly and heavily injured in Europe and North America, and chrysanthemum thrips, as the common name, was recently proposed. Cucumber, spearmint, and lettuce are also heavily injured, and many others are infested outdoors as well as in greenhouses. A complete list of hosts compiled from the references are meadow foxtail, wheat, "turf", horseradish, clover, alfalfa, bean, castor oil plant, pansy, lemon verbena, sage, spearmint, mullein, euphrasy, gloxinia, plantago, cucumber, marrow, "cucurbits", milfoil, chrysanthemum, aster, cineraria, false dandelion, centaury, dandelion, wild lettuce, lettuce, and hawkweed. The predominating family is Compositae and many plants of this family are its preferred hosts.

[1] Published with the approval of the Director as Technical Paper No. 121 of the Pineapple Experiment Station, University of Hawaii.

[2] Samuel *et al.* (9) stated that *T. nigropilosus* was collected in South Australia and was identified by the Imperial Institute of Entomology. Morison (4), to whom all of Samuel's specimens were presumably forwarded by the institute, did not list this species among those examined. Neither did the subsequently published monograph of Australian thrips by Kelly *et al.* (3) include this species. So the presence of *T. nigropilosus* in Australia is yet to be confirmed.

T. nigropilosus was first discovered in Hawaii during 1935, when it was severely injuring lettuce in a garden at Kapahulu, Oahu (5). It was again collected from weed hosts found among wild growth at high altitudes of Mt. Haleakala, Maui, and Waimea Canyon, Kauai, which indicated an earlier introduction and wider distribution (6). The present survey showed the above presumptions to be correct.

In view of the fact that lettuce is known to be a preferred host, lettuce patches scattered throughout the island of Oahu were surveyed in July at Kahala, Kapahulu, Pauoa, Moanalua, Pearl City, Honouliuli, Waianae, Wahiawa, Paukawelo, Kahuku, Heeia, and Kailua. The presence of this species was revealed in all districts except Waianae. In some patches large populations were found causing heavy injury, and in others no visible injury was found. Other associated thrips were *Leucothrips piercei, Thrips tabaci,* and *Haplothrips gowdeyi;* the former two were sometimes found to be the predominant species. Other field infestations of *T. nigropilosus* were found on chrysanthemum at Kalihi and Manoa, eggplant at Manoa, and carrot at Wahiawa. Chrysanthemum may be commonly infested over the island, as this is the most preferred host. Although these observations were limited to the island of Oahu, similarities may be sustained also on the island of Maui and Kauai, where this species was once collected. *Hypochaeris radicata* L. and *Plantago lanceolata* L. only are the known weed hosts. In testing this species for the transmitting ability of the yellow spot virus, many plants were used as hosts under confinement. *Emilia sonchifolia* DC. was found to be a highly favorable host plant. Other plants on which large colonies were established were spinach, celery, potato, eggplant, and *Datura stramonium* L. Adults survive only for a few days and could not establish colonies on young seedling pineapple plants, tomato, tobacco (variety Turkish), and garden petunia. No case of field collection from any of these plants has been achieved.

The material collected from chrysanthemum at Kalihi included brachypterous males, the first male specimens ever collected in Hawaii.

In short, this introduced species is now well established and widely distributed. It is common on lettuce but is a subincidental species on the whole, and its known host range of field infestations is rather restricted although the potential hosts are available in an extensive series.

OTHER THRIPS

The heretofore unrecorded host plants are listed in Table 1. A common species, *Selenothrips rubrocinctus,* was found infesting surinam cherry fruits. Another common species, *Hercinothrips femoralis,* was first found outdoors infesting *Emilia sonchifolia,* and heavily infesting celery and honohono in a greenhouse. *Chirothrips fulvus* Moulton was first collected elsewhere from the type

TABLE 1. NEW HOST RECORDS OF HAWAIIAN THRIPS

Selenothrips rubrocinctus (Giard)	Surinam cherry
Hercinothrips femoralis (Reuter)	*Commelina nudiflora* L.
	Celery
Chirothrips mexicanus Cwfd.	*Panicum purpurascens* Raddi
Scirtothrips antennatus Moulton	Parsley
Anaphothrips orchidii (Moulton)	Orchid
	Parsley
Leucothrips piercei (Morgan)	Chard
	Beet
	Radish
	Mustard
	Bean
	Hibiscus
	Parsley
	Eggplant
	Lettuce
Thrips hawaiiensis (Morgan)	Papaya
	Carrot
	Thunbergia
	Chrysanthemum
Thrips nigropilosus Uzel	Carrot
	Eggplant
	Chrysanthemum
Thrips tabaci Lind.	*Amaranthus gracilis* Desf.
	Kohlrabi
	Brassica chinensis L.
	Papaya
	Parsley
	Eggplant
Microcephalothrips abdominalis (Cwfd.)	Aster
Haplothrips gowdeyi Frank.	Pineapple
	Amaranthus gracilis Desf.
	Tomato
	Eggplant
	Lettuce
	Aster

locality, although some had been captured with wind traps in other districts. It was infesting the same host of the type at an altitude of 1,000 feet along the Waikane-Wahiawa trail. Another host of *Chirothrips mexicanus* was added. *Scirtothrips antennatus* and *Anaphothrips orchidii*, both incidental species, were collected from parsley and the latter was also found commonly on orchid. On examining a large number of vegetable gardens throughout the island, *Leucothrips piercei* was found to be one of the most common and abundant thrips on various vegetables. This species was not common on weed hosts. An infestation of *Taeniothrips simplex* Morison on gladiolus was reported from Olaa, Hawaii, and another heavy infestation on extensive plantings was observed at Wahiawa, Oahu. A common flower feeder, *Thrips hawaiiensis*, was collected from four additional plants. Six others were added to the host list of *Thrips tabaci*. On papaya a small number of adults and larvae

were incidentally collected from leaves and flowers. This species was frequently observed in flower cavities of young pineapple fruits. In the course of the experiments on the transmission of the yellow spot virus (7), data on the suitability of various heretofore unrecorded plants for feeding of *T. tabaci* were collected. The plants on which large colonies were established under confinement were *Commelina nudiflora* L., *C. vengharensis* L., chard, spinach, cauliflower, broad bean, celery, potato, eggplant, bell pepper, *Datura stramonium* L., chicory, endive, and summer chrysanthemum. Colonies were less vigorous on beet, not established on New Zealand spinach, *Nicotiana glutinosa* L., and garden petunia. A predominating species, *Haplothrips gowdeyi,* was collected from six new hosts. This species was incidentally collected from young pineapple fruits, presumably feeding on flowers. This is the first record of collection from this host.

The feeding experiments on *Emilia sonchifolia* under confinement indicated that *Leucothrips piercei, Taeniothrips alliorum* Pr., and *Plesiothrips panicus* (Moulton)[3] did not survive on the plants, but *Thrips hawaiiensis, Microcephalothrips abdominalis,* and *Haplothrips gowdeyi* survived only when blossoms were available.

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[3] Dr. J. D. Hood advised that this species has been referred from *Thrips.*

Musings of an Armchair Philosopher[1]

CARL T. SCHMIDT
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(Presidential Address at the meeting of December 1, 1938)

The eminent botanist, Dr. J. Arthur Harris, speaking before a group of graduate students in science, brought forth the extremely challenging idea that in any science as it expands, the real advances being made are those which are out on the border where they either impinge on one of the other sciences or where they are at the point of developing a new science entirely different from any we know at present. This conception is something for us as entomologists to consider seriously in relation to our own field because too often we are inclined to dig ourselves down in the center of our own specialization of taxonomy, physiology, insecticidal chemistry, biological control, or what you will, rather than training our thoughts out at the borders where the advances can be made. True enough, it is of interest and value to continue with the description of new species until we have exhausted all the faunal possibilities of a region, to study the morphology until we have pictured and described all of the physical features of the beast, or to determine the physical and chemical constants of an insecticidal oil until we have them all in their proper categories determined to the fourth decimal place; but in so doing we are perhaps more likened to the cataloger or compiler rather than to the productive and independent research worker. One characteristic of the majority of workers in any science is that they tend to work their way toward the interior regions of their chosen field where many have already passed over, instead of being at the frontier. The student preparing his mind for work in science is privileged to prowl through the regions where others have already done the fundamental work, but those who profess to be active workers in research must not retain the qualities of the infantile mind but must be out where the trails are absent or few. It is there that the new developments will occur.

It is, of course, out of the question for us to explore in the time allotted to us today the complete fringe of our own chosen field of entomology even as it presents itself to us here in these islands. Realizing this I shall only attempt to indicate some of the paths that run out to the wilderness of the unknown.

BIOLOGICAL CONTROL

Since we in Hawaii have among our membership some of the pioneers in the field of the biological control of insects, it is fitting

[1] Published with the approval of the Director as Miscellaneous Paper No. 31 of the Pineapple Experiment Station, University of Hawaii.

that we first consider where the borders lie and where we may expect to find advances.

There has grown up in recent years a new conception of insects in their relation to their environment. This is commonly expressed in the form of the populations. The earlier attempts, such as those of Thompson, had in mind primarily the prediction of the time it would require for an insect to be overcome by an introduced enemy. As we look at his work now we realize that his was a purely hypothetical example which took into account neither the complexity of factors surrounding the host insect and its enemies nor the fact that insect populations do not conform to the peculiar conditions he presumed for the growth of populations. The important thing about his work was that he set to work on a new idea which promises to bear fruit for us in the future. His work, using the tool of mathematics, was followed by that of others—Chapman, Volterra, H. S. Smith, and other men who at this time comprise a considerable list. How useful it would be if when out on an exploration for natural enemies we could establish ourselves in a laboratory, once we had encountered possible useful natural enemies, determine certain characteristics of these animals and determine in advance what the result would be if they were released in our fields. No doubt this idea seems a bit fantastic but no more so than that of the group of chemists who followed Mendeleef, who predicted not only the existence of certain then unknown elements but calculated what the characteristics of these unknown elements would be if they should ever be encountered.

Our present methods, whereby we import parasites and release them blindly in the hope that they will alter the level of the insect pest, will probably be looked on in the future as the utmost in naïveté. What do we know concerning the ramifications which may result from the bringing into our islands of certain predacious forms? We can say that in general we are probably fairly secure, but we really know nothing concerning the interrelating results to be expected when we upset one balance in nature to bring it to a new level. Compensating forces will operate to bring new balances into operation but we cannot predict with any degree of certainty what they will be. It is not impossible to conceive of such a chain of events taking place as that of introducing *Bufo* to control *Anomala*. *Bufo*, however, is responsible for killing the mongoose which keeps down rats to a certain degree. With the rat population rising we could also expect an increase of fleas. More fleas would mean a greater incidence of plague in rats. More rat plague would increase the danger to humans with the possibility of an epidemic of plague in humans. The above sequence did not occur but it points out how little we know of such biological sequences. Not even enough to serve as a basis for generalization, much less to be of practical use in introduction work.

TAXONOMY

The field of taxonomy has been built up on the conception that description of insects must be based on morphological characters. The system of classification is useful and workable but it does have the serious handicap of having become unwieldy and extremely complicated; and in the last analysis many species depend for their identification on the opinion of the individual taxonomist. Likewise, our system of naming has become ponderous, as it must where morphological characters are the basis of classification. There is no question but that a decimal system might be arrived at which could be extremely workable and simpler. Perhaps some bright young entomologist may some day arrive at a means of making determinations of species on the basis of spectrographic analysis of the specimen which might lend itself to a scheme which though it would throw our present classification entirely into obsolescence, would be so entirely suitable that it would replace to a high degree the cumbersome system we are now using. At present it seems difficult to conceive of the usage of such a combination as 27 : 346 : 11 : x to represent *Pseudococcus brevipes,* and the description being based on combinations of absorption lines in a spectrum; but while it is fantastic, so was the telephone until it was developed to the point where it was workable and adaptable to human use.

With the numbers of species of insects continually growing and our literature bulging with descriptions, there must come a time when changes will be made in classification systems. It may be that my suggestion above will prove ridiculous, but simplicity will certainly come and it will come along new fundamental principles when it does appear. It is not too soon to be searching for these principles.

SUSCEPTIBILITY

Any agriculturist knows that when he walks through a field bearing an insect infestation certain plants will be entirely free from damage. He knows too, that if he selects the progeny of those plants the succeeding generation will still show approximately the same degree of damage since what appears to be resistance is really only a degree of individual susceptibility. In the case of mealybug wilt of pineapple such is certainly the case and we can only presume that there is a deficiency in the soil at the particular spot where the diseased plant is growing which enables the disease to make its appearance on certain plants and to be masked in others. The problem is one that is certainly on the borderline of entomology. We know the insect and its habits and characteristics well enough but the solution of the problem does not lie in that direction. Research must go in the direction of plant physiology and particularly in the method in which the plants utilize mineral nutrients. In the plants which do not wilt certain physiological balances must exist which neutralize the effects of the toxin of the mealybug. May we not

visualize the same method for approach of other problems involving sucking insects? It may well be that the day will come when the chemist will be considering not methods whereby he may kill the pest but rather means of modifying the soil and thus the physiology of the plant so that it becomes tolerant of the presence of the insect.

INTERNAL THERAPY OF PLANTS

Along similar lines as the preceding and a question that likewise borders on physiology is the question of the possibility of injecting materials into the plant which will be absorbed and be either toxic to the insect or will render the plant immune to attack. Certain rather crude experiments have been performed whereby plants have been rendered immune to attack by aphids through injection of certain materials into the conducting system of the plant. The success by which certain diseases of man and animals have been treated by the use of injection of complex compounds into the circulatory system suggests that a whole new field is open here for investigation. There are, without doubt, compounds which plants can tolerate which would confer immunity to insect attack; but advance has been slow, primarily because methods for bringing such treatment about are still very crude. We may yet see the day when the "tree doctor" carries a hypodermic syringe with him as an indispensable part of his equipment.

INSECTICIDES

The field of insecticidal chemistry is one in which advance is being rapidly made at the present time. This is attested to in the fact that in browsing through literature one finds a whole host of materials, of which he has only vague recollections from his courses in chemistry, being tried and in some cases actually put into application on a commercial scale. It is true that the present cost of some of these materials makes their use prohibitive. However, cost alone cannot be considered to be the sole governing factor for the entomologist to consider where he is investigating chemical materials for their toxic properties. Any insecticide is cheap or costly only in relation to the value of the crop which it is designated to protect. If it so happens that it costs thirty dollars per acre and yet increases the yield for a given field to twice that amount it is still a cheap and entirely feasible material to use commercially. Much still remains to be known concerning the toxic fractions of the insecticides which we are commonly using. In the insecticidal oil now in use we are probably paying a considerable sum for material which in no way is related to the toxicity of the material, simply because the toxic elements are found in a rather expensive carrier. If we could determine what those elements are it might be entirely possible to synthesize them at a cost much below that which we pay at present and combine them with water; and in so doing not only reduce the costs but also have the material in a much more convenient form.

HOST SEQUENCES

The subject of host sequences is one that is virtually untouched and yet there is much of value hidden in such information. Carter showed the way for this line of research when he found that there was a relation between the symbionts of mealybugs and their ability to produce green spots on pineapple; and moreover that the symbiont complex of the mealybug could be altered dependent on the host plant on which the insect had last fed. It is very likely that there are other cases where the toxicity of the insect to the plant is correlated with its internal fauna affecting its secretions and there is even the possibility of utilizing this principle in reducing the damage from those insects. If, for instance, it were found that the toxic element could be removed by host transfers, this could be done on a field scale by growing, during the intercycle period, between the main crops, certain plants having this characteristic, and forcing the pest to lose its toxic principle. Save, perhaps, for certain instances among the aphids where there is some information regarding host sequences and their effects, the field is one in which virtually nothing of a precise nature is known. The idea is new but information permitting its use as a control principle is neither available nor apparently forthcoming, for the present at least.

HOST AVOIDANCE AND SELECTION

It is well known that insects show certain characteristics in their selection of hosts. Some of them are almost specific in that they must not only have a certain variety of host species but they are limited to definite portions of the host and cannot survive on other portions. In contrast to this there are the cases of completely omnivorous insects which show few if any indications of being particularly selective in their choice of food materials. The factors here involved are but poorly known. In most cases this is thought to be related either to the sense of taste or smell of the insect but in observing the precise way in which the characteristic operates, it no doubt is also relayed to the entire psychological make-up of the animal. Research along this line has not shown too much of value for practical application. The chemistry involved is both delicate and difficult but in many cases it is certain that some slight alteration in the substrate to which the insect is exposed on the plant would be all that would be necessary to mask the material that is responsible for the insect's choosing it as a favorable host plant. It is certainly not a far-fetched approach but yet is one that should yield valuable information to the research worker if it could be determined what the general principles are that are responsible for host selection or avoidance.

Sclerogibbidae, a Hymenopterous Family New to Hawaii

BY O. H. SWEZEY
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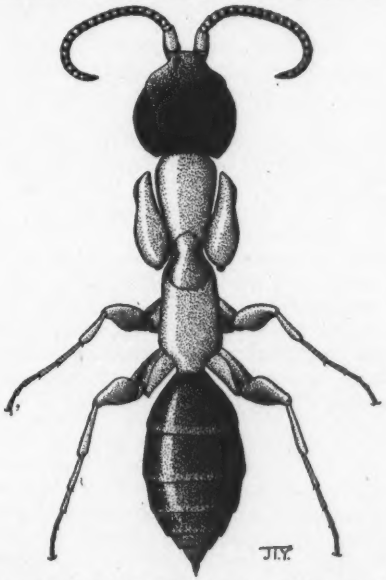
(Presented at the meeting of April 7, 1938)

While sweeping on *Gossypium tomentosum* on the flats near Makapuu Head, March 20, 1938, a strange looking Hymenopteron was found which presented great difficulties in locating it in any familiar family. Finally, Dr. Williams ran it to Sclerogibbidae in Brues and Melander's "Classification of Insects." This is a family for three genera: *Sclerogibba,* described by Stefano in 1887–88 for the species *crassifemorata* from Ustica (an island north of Sicily), placed doubtfully in Bethylidae by Ashmead; *Mystrocnemis,* described by Kieffer in 1905 for *erythrothorax* from Rangoon and placed in Proctotrypidae; *Cryptobethylus,* described by Haliday and Marshall from Italy (Species?) in 1905.

In 1905, Kieffer treats of Sclerogibbinae as a subfamily of Bethylidae, and describes *Mystrocnemis embiidarum* from Ceylon. In Brues and Melander's "Classification of Insects" is the first place



Mystrocnemis vagabundus (Bridwell), ×30. The fore tibia and tarsi are hidden by the femora, as it was not possible to spread them out for drawing.

where I have seen the group given the rank of family. In their keys, the characters by which it is distinguished from Bethylidae are noted, particularly the antennae with 22 to 44 joints instead of the 12 to 13 joints of the Bethylidae, and the antennae are inserted at the anterior margin of the head which is flat and horizontal.

From the Zoological Record, I find that there have been four species of *Mystrocnemis* described: *africana* from Portuguese Guinea; *erythrothorax* from Rangoon; *capensis* from Cape Town; *embiidarum* from Ceylon. The latter is by Kieffer in Entomologische Mitteilungen, XIV, p. 236, 1925. This journal is in the H.S.P.A. library, and I have compared the description with my specimen and find it to agree in detail, with possibly one exception. In the description, the antennae are said to have 24 joints, while in my specimen I can count only 22 joints. I do not know whether one should allow for a variation in the number of the antennal joints, or whether there is a possibility of miscount in either case.

At any rate, I feel satisfied in using the name *Mystrocnemis embiidarum* Kieffer for my specimen, the more so as it may be that I shall yet find that it is breeding on our embiid (*Oligotoma insularis*) when I make sufficient search in the same locality. In Ceylon it was reared from *Oligotoma greeniana.*

(Later Note)—While in the National Museum, Washington, D. C., in November, 1938, in discussing this insect with Mr. J. C. Bridwell, it called to his recollection an insect collected by him at Kaimuki, Oahu, in 1916, and described as *Lithobiocerus vagabundus,* new genus and new species. On later comparing my specimen with Bridwell's descriptions in Proceedings of the Hawaiian Entomological Society, IV, pp. 35, 36, 1919, it appears to be the same thing. Dr. F. X. Williams concurs in this. Hence, unless further study from more material which might be obtained causes a reversal of opinion, the name *vagabundus* Bridwell will be used for this insect, it being published in 1916, earlier than *embiidarum* Kieffer, which was published in 1924. Bridwell's genus *Lithobiocerus* will sink, however, as *Mystrocnemis* was described by Kieffer in 1905. So, pending further developments, *Mystrocnemis vagabundus* (Bridwell), a possible parasite of our embiid *Oligotoma insularis* McLachlin, invites further research.

Notes on Oedemeridae in Hawaii and Palmyra

BY O. H. SWEZEY
Experiment Station, H.S.P.A.

(Presented at the meeting of July 7, 1938)

Ananca bicolor (Fairmaire)

Nacerdes bicolor Fairm., Rev. Zool. (2), I, p. 454, 1849.
Ananca collaris Sharp, Trans. Dublin Soc., III, (II), p. 169, 1885.
Oxacis collaris, Perkins, Fauna Hawaiiensis, II, p. 247, 1900.
Ananca bicolor, Blair, Insects of Samoa, IV, 2, p. 92, 1928.

This was the first oedemerid collected in Hawaii and the only one listed in the Fauna Hawaiiensis. It was collected by Blackburn and described by Sharp in 1885. Perkins, in the Introduction to the Fauna Hawaiiensis, says it "is certainly an importation." It has sometimes been found very abundant, as mentioned by Dr. Perkins, and as noted at various times in the Proceedings of the Hawaiian Entomological Society. It is now known on the five main islands of the Hawaiian group, usually having been collected when coming to lights, and on one occasion segregated in large numbers on coconut leaves, and on another attracted abundantly to the flowers of *Tournefortia argentea*.

We have all along used the name *Oxacis collaris* as given by Perkins in the Fauna Hawaiiensis, but lately I noticed a similarity to *Ananca bicolor* as identified by Blair in the collection of Samoan insects at the Bishop Museum. On carefully comparing them, I can find no difference, hence, consider our species to be the same, and *collaris* must therefore be a synonym. The distribution as given by Blair is: Samoa, Tahiti, Marquesas, Tonga, Ellice Is., and New Hebrides.

Ananca decolor (Fairmaire)

Nacerdes decolor Fairm., Rev. Zool., (2), I, p. 455, 1849.
Ananca decolor, Blair, Insects of Samoa, IV, 2, p. 92, 1928.
Ananca decolor, Blair, Marquesan Insects, II, p. 290, 1935.

A few specimens of a pale brown species have been collected in Hawaii: 1 at Puako, Hawaii, May 12, 1905; 1 on wharf, Honolulu, June 6, 1911; 1 on S. S. Mauna Kea, Hilo, Hawaii, May 24, 1915; 3 at light, Kaunakakai, Molokai, June 6, 1932. The two from Hawaii were identified in 1921 as *Ananca sinensis* (?) by Bryant at the Imperial Bureau of Entomology. Now, comparing these specimens with *decolor* in the Samoan collection at the Bishop Museum, I can find no difference. The three specimens from Kaunakakai, however, may not be the same species, as they have a dark stripe on each elytron. *Ananca decolor* occurs also in Tahiti and Marquesas, and is said by Blair to be "of wide oceanic distribution." In the

Bishop Museum collection are three specimens collected at Palmyra Islands, July, 1913, by Dr. C. M. Cooke, Jr., and five collected by Lorrin A. Thurston, May, 1922.

Ananca kanack (Fairmaire)

Nacerdes kanack Fairm., Rev. Zool., (2), I, p. 454, 1849.
Ananca kanack, Blair, Insects of Samoa, IV, 2, p. 91, 1928.

This large species occurs in Samoa, Tahiti, Fiji, Solomon Islands, New Caledonia, Mysol, etc. In the Bishop Museum collection are 14 specimens collected at Palmyra Islands, July, 1913, by Dr. C. M. Cooke, Jr., and one specimen collected by Lorrin A. Thurston, May, 1922, at the same place.

Records of Immigrant Insects for the Year 1938

BY THE EDITOR

In this issue of the Proceedings, the following new immigrant insects are recorded for Hawaii. Those marked with an asterisk were observed for the first time at the date mentioned in 1938. The others were previously known under a different name, which is herein corrected. For details of records, etc., refer in the text to the pages given.

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A New Species of Hippodamia from Mt. Rainier (Coleoptera: Coccinellidae)

BY P. H. TIMBERLAKE

Citrus Experiment Station, Riverside, California

(Presented by the Secretary at the meeting of September 1, 1938)

Hippodamia washingtoni new species

Closely allied to *H. falcigera* Crotch by the male genitalia, but having the maculation of the elytra very different. It is apparently the "subspecies of Oregon and California" mentioned by Johnson under his treatment of *H. 13-punctata* (Carnegie Institution of Washington, Publication No. 112, p. 52, 1910). The elytral pattern agrees well with his Fig. 36, d and f.

Head black, with irregular clay yellow mark between the eyes. Antennae and maxillary palpi dark ferruginous. Labrum brown. Outer surface of mandible clay yellow. Pronotum with a central black mark, with front and side margins broadly clay yellow. Medial black most extremely variable; in holotypes about as in *H. tibialis*, with a blunt lateral spur on each side. Medio-basal pale spot often absent, but in one paratype greatly enlarged and tenuously prolonged obliquely forward on each side to join with pale area on apical margin, thus isolating a subquadrate black spot on center of disk and an irregular, oblique mark on each side. Elytra generally more reddened than pale parts of pronotum, each with six black marks. Spots ½ and 3 united to form a common bell-shaped or half dumbbell-shaped mark on suture. Spot 1 large, its outer margin on the callus. Spot 2 small, close to lateral margin and sometimes absent. Spots 5 and 6 usually large, nearly equal and subequal to spot 1. Spot 4 rather small and often confluent at inner anterior margin with spot 5. In several paratypes spot 6 is reduced and in one specimen represented by a small dot. In the same specimen spot 2 is absent and 4 also very small. Scutellum, legs and under surface of thorax and abdomen black. Length, 5.25 to 5.5 mm., width about 2.9 to 3 mm.

Male genitalia agree closely with *H. falcigera* Crotch, and the only difference that stands out without comparison of specimens (not at the moment possible) is the comparatively large blunt projection near apex on dorsal margin of sipho. In *falcigera* this projection is smaller than in *tibialis*, but in *washingtoni*, it is much larger than in that species.*

Described from 7 males, 11 females (holotype ♂, allotype and paratypes) from Longmire Springs, Mt. Rainier, Washington, 2,700 ft., July 19, 1935 (H. P. Lanchester).

* Later, Dr. Edward A. Chapin kindly compared the genitalia of a paratype deposited in the U. S. National Museum with the genitalia of *H. falcigera* and reported that they are decidedly different. He states that the slender projection, which lies between the median lobe of the tegmen and the broad paddle-like lateral lobe, is gently curved and acuminate at apex in *washingtoni* whereas it is straighter with a recurved hook in *falcigera*.

However, I note that there is a slight hook at the apex of this slender process in the holotype of *washingtoni*, but it is probably much less developed than in *falcigera*. Other differences suggested by Dr. Chapin's sketches are the broader lateral lobes (parameres) of the tegmen in *washingtoni* and the shape of the median lobe at apex. In *washingtoni* the apex is narrowed to a small median nipple-like extension and in *falcigera* it is simply acute.

Holotype and allotype and 4 paratypes in collection of Citrus Experiment Station, 2 paratypes in collection of H.S.P.A. Experiment Station, 2 paratypes in collection of California Academy of Sciences, 2 paratypes in U. S. National Museum, and remainder in collection of F. T. Scott.

A New Genus of Pacific Island Enicocephalidae with New Species from the Hawaiian and Philippine Islands (Hemiptera)

BY ROBERT L. USINGER
California Academy of Sciences

(Presented by the Secretary at the meeting of Sept. 1, 1938)

In a general introductory account of this curious family of gnat-bugs[1] I remarked that the group "is cosmopolitan in its distribution, being found on all of the main continents and on the major island groups with the exception of the Hawaiian Islands." A year of collecting, 1935–1936, on all of the large islands of the Hawaiian group and a study of the accumulated collections of the past half century in the territory seemed to confirm the above quoted generalization.

In the Spring of 1936, however, Mr. O. H. Swezey discovered some additional boxes of Hemiptera in the stored material at the Hawaiian Sugar Planter's Experiment Station. A glance at the contents of one of these boxes disclosed the single specimen which is made the type of the genus described below.[2] The venation of this specimen was entirely unique, not having been described for any Enicocephalid known at that time. It was unusually interesting and significant, then, to discover two specimens, obviously congeneric, of another species, this time from the Philippine Islands, while studying the miscellaneous unworked Hemiptera at the Museum of Comparative Zoology.

Our knowledge of the biology of these interesting bugs is still very fragmentary. The single specimen collected by Mr. E. H. Bryan, Jr., on Maui is the only specimen which has come to light in over fifty years of more or less intensive collecting in these islands. Equally inexplicable is the case of *Systelloderes pellucidus* (Horvath), described just fifty years ago from Southern Europe and never recorded since. Two gigantic nymphs of an unknown species were collected twenty years ago by Dr. F. E. Blaisdell at Fairfax, Marin County, California, a popular collecting ground from which no other specimens, nymphs or adults, have been taken since. In Southern Mexico I have collected thousands of these bugs swarming in the air like Chironomids towards dusk, only to return to the same field the following morning and find no trace of the species. The "commonest" California species is *Hymenocoris formicina* Uhler, known only from five specimens collected at scattered localities throughout the State until recently discovered swarming at Milpitas, near San Francisco Bay, by A. E. Michel-

[1] Usinger, R. L., Pan-Pac. Ent., 8: 145–156, 1932.
[2] Usinger, R. L., Proc. Haw. Ent. Soc., 9: 362, 1937.

bacher and B. E. White. The only species which I have ever encountered in numbers outside of swarms is *Systelloderes angustatus* (Champion) which was found in association with ants beneath bark of fallen Pine trees in the high mountains of Mexico. For the present, then, the best method of collecting Enicocephalids is to sweep one's net through every swarm of "Chironomids," especially towards evening or after a rain.

Nesenicocephalus Usinger, new genus

Very small, slender species with a highly polished body surface sparsely clothed with fine, erect hairs. Head shaped much as in the genus *Systelloderes*, the posterior lobe subquadrate, being a little broader posteriorly than in front; a very prominent constriction just behind the eyes separates the head into two distinct lobes. Ocelli very prominent, located at anterior margin of posterior lobe near constriction. Antennae shorter than head and pronotum together, the first segment shortest, the following three subequal. Pronotum unarmed, simple, the anterior and posterior constrictions very prominent, delimiting three posteriorly progressively widening lobes, without a longitudinal suture at middle; shallowly but distinctly angulately emarginate on posterior margin. Scutellum broad at base but abruptly narrowed just behind this to form a broad, rounded posterior projection. Totally membranous hemelytra, when folded at rest, narrow at middle, dilated and rounded posteriorly; thickened costal margins transversely rugose; venation characteristic of the genus and differing from all other Enicocephalids known to me in the closed discal cell with basal discal cell wanting (figure 1). Anterior coxal cavities open behind. Front femora scarcely incrassate, front tibiae only feebly dilated apically, their greatest width less than greatest width of femora. Anterior tarsi one-segmented and bearing two very fine claws. A few very long hairs at apex of abdomen beneath. Color fuscous or ferrugineous to black with lateral margins of hemelytra tinged with reddish and bases of hemelytra sometimes white.

Genotype: *Nesenicocephalus hawaiiensis* Usinger, new species.

Nesenicocephalus hawaiiensis Usinger, new species (fig. 1)

Surface faintly roughened on head and pronotum, sparsely beset with white hairs which are longest on pronotum and front femora. Head as long as pronotum, its anterior lobe, including eyes, equal in width to pos-

FIG. 1. *Nesenicocephalus hawaiiensis* Usinger, new species.

terior lobe; posterior lobe, between anterior and posterior constrictions, transverse, 5::4, its sides almost imperceptibly dilated posteriorly; eyes small, the interocular space above, greater than width of one eye, beneath, only equal to one-half width of one eye; ocelli prominent, distinctly elevated. Rostrum short and stout. Antennae equal in length to head and anterior two lobes of pronotum; slender, the first and second segments thickest, less than half the thickness of base of anterior tibia, second segment narrowed on basal half, third segment linear, fourth slightly thickened, fusiform; proportion of segments one to four as 2:4.5:4.5:5. Pronotum broader at base than long, 12::9.5, the anterior lobe shortest, middle lobe intermediate, and hind lobe longest in the proportion of 2:3.5:4.5; anterior lobe slightly less than one-half as wide as posterior lobe, intermediate lobe over three-fourths as wide as posterior lobe; anterior margin scarcely emarginate; humeral angles rounded. Hemelytra beset with a sparse, white pubescence at apex and more or less on the margins and veins. Anterior femora but little dilated, one-fourth as thick as long. Tibiae likewise slender, their inner apices bearing several long setae. Hind femora rather stout, slightly more than one-fourth as thick as long. Front tarsi and claws very short, scarcely longer than width of tibiae apically. Venter clothed with a sparse, irregular, white pubescence.

Color slightly darker than fulvous, tending more towards fuscous. Lighter, fusco-testaceous, on part of the rostrum, the apical two antennal segments, apices of front femora, and tarsi. Eyes brown. Ocelli red. Scutellum faintly suffused with red. Abdomen ferrugineous. Hemelytra subhyaline, infuscated throughout but obscurely paler on basal eighth; thickened costal margins and stigmata red.

Length 2.32 mm., width (pronotum) .48 mm., (hemelytra) .60 mm.

Holotype, B. P. Bishop Museum, taken on the ridge above Haelaau on West Maui at an elevation of 3000 to 3300 feet, December 21, 1928, by E. H. Bryan, Jr.

Nesenicocephalus philippinensis Usinger, new species

Body surface faintly, rugosely punctate or roughened and beset with a moderately dense vestiture of white hairs. Head a little longer than greatest length of pronotum; anterior lobe, including eyes, a little narrower than posterior lobe; posterior lobe transverse, 6.5::5.5, its sides more gradually rounded anteriorly; interocular space above not quite twice as wide as an eye, beneath much smaller; ocelli small but distinct and elevated. Rostrum moderately stout, short, and roundly deflected downward and posteriorly. Antennae not quite as long as head and pronotum on median line; first two segments thickest, third linear, fourth fusiform; proportion of segments one to four as 3:6:7.5:7. Pronotum broader at base than long, 15::12; lobes progressively longer from apex to base, 2.5:5:5.5, and progressively wider, 6:10:15; lateral margins not carinate; humeral angles rounded. A few setae along the veins of hemelytra and more along costal margins. Anterior femora a little more than one-fourth as thick as long. Tibiae less strongly dilated at apices than greatest width of femora. Tarsal segments almost as long as width of apices of tibiae and the longer front claw longer than this width. Hind femora one-fifth as thick as long. Venter flattened and, in the shriveled examples before me, with a median longitudinal keel formed by a folding of the abdomen.

Color dark pitchy fuscous to almost black. Testaceous to white on the basal one-eighth of hemelytra, apices of middle and hind femora, and meso and metatibiae and even tarsi. Abdomen and middle and hind femora ferrugineous. Hemelytra subhyaline, suffused with brown, the costal margins and stigmata tinged with reddish.

Length 2.97 mm., width (pronotum) .57 mm., (hemelytra) .73 mm.

Holotype, Mus. Comp. Zool., Galog River, 6000 feet, Mt. Apo, Mindanao, P. I., September 1928, C. F. Clagg collector, and one paratype, Todaya Plateau, 5000 feet, Mt. Apo, Mindanao, P. I., September 2, C. S. Clagg.

This species differs from *hawaiiensis* chiefly in its considerably larger size, darker color with distinct white bases of hemelytra, and larger anterior tarsi and claws.

Distribution and Host Relationships of Cyrtorhinus (Hemiptera: Miridae)

BY ROBERT L. USINGER
California Academy of Sciences

(Presented by Mr. Fullaway at the meeting of Dec. 1, 1938)

As the genus *Cyrtorhinus* Fieber seems destined to play an increasingly important role in the biological control of Delphacid leafhoppers it is of interest to examine its distribution and host relationships. Present records suggest that the group may eventually prove to be cosmopolitan, the paucity of records from Central and South America, Australia, and Africa very possibly being due to the fragmentary state of our knowledge of the Mirid fauna of these regions.

Although known from Europe since 1807 (*caricis* Fallen) and from the East Indies since 1884 (*lividipennis* Reuter) no member of the genus was recorded from North America until 1916 (*caricis* var. *vagus* Knight) while the predatory habits of the group were not discovered until 1920. At this time Muir's discovery that *Cyrtorhinus mundulus* (Breddin) lives exclusively on the eggs of the Sugar-cane Leafhopper, *Perkinsiella saccharicida* Kirkaldy, led to one of the most outstanding successes in the field of biological control of injurious insects.

Delphacids imbed their eggs in rows either along the stems or midribs of the leaves of their preferred hosts. The eggs are inserted in a slit and directed obliquely with one end at the surface of the plant tissue. *Cyrtorhinus,* although belonging to a predominantly phytophagous subfamily, Orthotylinae, of the great plant feeding family Miridae, has evidently turned to an exclusively predatory life, piercing the eggs of these leafhoppers and sucking out their juices. Even when apparently inserting the beak into unbroken plant surfaces I have always found that a leafhopper egg was the objective, perhaps having been laid from the opposite side of the leaf. I have shown[1] that the change, even from plant feeding to sucking the blood of human beings is not so fundamental as it might at first appear and Esaki[2] actually records facultative blood-sucking in *Cyrtorhinus lividipennis* Reuter.

In recent years field records would indicate that these bugs, although showing a marked preference for a particular plant and its associated Delphacid eggs, may turn to related plants and leafhoppers in the vicinity as occasion or opportunity affords. Thus I

[1] Usinger, R. L. Bloodsucking among phytophagous Hemiptera. Can. Ent., 66: 97–100, 1934.
[2] Esaki, T. A case of the facultative "blood-sucking" in *Cyrtorhinus lividipennis* Reuter with notes on the same habit in some Typhlocybinae. Mushi, 7: 97–100, 1934.

found *mundulus* nymphs and adults occasionally on corn and Swezey and Fullaway found this same species on taro in the Hawaiian Islands while *lividipennis* was observed on sugar cane on Guam but only when the cane was growing near or in between plantings of corn. This characteristic adds greatly to the value of *Cyrtorhinus* bugs in biological control for it enables them to survive after completely wiping out their preferred host in a given area. It is encouraging that *mundulus* has shown no tendency as yet to invade the native forest in Hawaii where a rich endemic population of Delphacids flourishes.

An apparent structural anomaly in *Cyrtorhinus* which has not been given sufficient attention is the absence, in certain species, of arolia between the claws. In such cases two very fine, small, parallel setae are the only structures to be seen between the claws. The presence or absence and form of the arolia is usually a very reliable guide to relationships in the Miridae, having been used by both Reuter and Knight in defining major groups within the family. Poppius first pointed out the absence of these structures in his two Formosa species and in *mundulus*. They also appear to be lacking in *riveti*.

Mr. D. T. Fullaway has recently sent for identification, through Mr. O. H. Swezey, specimens of *Cyrtorhinus fulvus* Knight, a species which has been introduced into Hawaii during the past year in an effort to control the Taro Leafhopper, *Megamelas proserpina* Kirkaldy. As much as two years ago, after carefully observing its habits and rearing a number of specimens on Guam and in the Philippines, I suggested that *lividipennis* be considered for introduction into the Hawaiian Islands to control the Corn Leafhopper, *Peregrinus maidis* (Ashmead). There is some indication that this may actually be done in the near future.

DISTRIBUTION OF CYRTORHINUS SPECIES ACCORDING TO ZOOGEOGRAPHICAL REGIONS

PALAEARCTIC
caricis Fallen
flaveolus Reuter
geminus Flor
parviceps Reuter
pygmaeus Zett.
var. *insignis* D. & S.

NEARCTIC
alboornatus Knight
balli Knight
caricis Fallen
var. *vagus* Knight
insperatus Knight
pubescens Knight
pygmaeus Zett.

NEOTROPICAL
costae Stål
pellicius Uhler

AFRICAN
melanops Reuter

ORIENTAL
annulicollis Poppius
chinensis Stål
elongatus Poppius
fulvus Knight
lividipennis Reuter
mundulus Breddin

AUSTRALIAN
mundulus Breddin

PACIFIC
fulvus Knight
lividipennis Reuter
mundulus Breddin
riveti Cheesman

DISTRIBUTION OF PACIFIC ISLAND SPECIES[3]

fulvus	*lividipennis*	*mundulus*	*riveti*
*Philippine I.	Great Nicobars	Australia	Tahiti
Samoa	Formosa	Java	Samoa
*Java	Java	Philippine I.	*Guam
Hawaii (1937)	Ceylon	Fiji I.	
	Burma	Hawaii (1920)	
	Sumatra		
	Japan		
	*Guam		
	*Philippine I.		
	*China		

PLANT AND LEAFHOPPER HOST RECORDS FOR PACIFIC SPECIES[3]

mundulus

Perkinsiella saccharicida Kirk. on Sugar Cane (preferred host).
**Peregrinus maidis* (Ashmead) on Corn (Hawaii).
Megamelas proserpina Kirk. on Taro (Hawaii).

lividipennis

**Peregrinus maidis* (Ashmead) on Corn (preferred host) (Guam and Luzon, P. I.).
On *Sporobolus* grass (Samoa, Swezey and Wilder).
Nilaparvata lugens (Stål) on Rice (Guam, Swezey).

fulvus

**Megamelas proserpina* Kirk. on Taro (preferred host) (Philippines, Fullaway).
On Taro (Samoa, Swezey & Wilder).

riveti

**Sogata ochrias* (Kirk.) on *Sporobolus virginicus* (Guam, Swezey and Usinger).
On Bermuda grass (Samoa, Swezey and Wilder).
Tradescantia (Tahiti, Cheesman).
**Nilaparvata lugens* (Stål) on Rice Guam, Swezey).

KEY TO PACIFIC ISLAND SPECIES OF CYRTORHINUS

1. A pair of distinct diverging and then converging arolia between the claws. Head with a more or less distinct pattern formed by broad pale areas contiguous to inner margins of eyes on either side and sometimes meeting at center, always joined along posterior elevated margin before neck 2
–. Two very fine, small, parallel setae between the claws. Head with a more or less distinct pale spot on either side of vertex contiguous with inner margins of eyes 3
2. Length to tip of membrane three times the greatest width across hemelytra. Pale areas of upper surface fulvous and limited largely to the vertex, pronotum occasionally obscurely on the callosities and at middle of posterior margin, scutellum on either side of median black stripe, and hemelytra ..... **fulvus** Knight
–. Length less than three times the greatest width across hemelytra. General color much paler, ochraceous to green, with fuscous or black marks limited mainly to anterior portion of head, sides of posterior lobe of pronotum, and middle of scutellum ..... **lividipennis** Reuter
3. Body form long and slender. Size large, the length 3.08 to 3.42 mm. and width 1.05–1.12 mm. Hemelytra pale only laterally. First antennal segment fulvous ..... **mundulus** Breddin
–. Body form relatively short and oval. Size smaller, the length 1.87 to 2.33 mm. and width 0.73 to 0.94 mm. Hemelytra often pale fuscous or lighter throughout. First antennal segment black ... **riveti** Cheesman

[3] New records marked with an asterisk*.

Larvae of Hawaiian Elaterid Beetles*

BY R. H. VAN ZWALUWENBURG
Experiment Station, Hawaiian Sugar Planters' Association

(Presented at the meeting of February 3, 1938)

According to Böving and Craighead,[1] the larvae of the true elaterids have the head capsule and mouthparts only slightly reduced, and possess distinct frontal sutures; the gular area is small and indistinct, or represented only by a median gular suture. The Throscidae and Melasidae, on the contrary, have the head capsule and mouthparts greatly reduced or extremely specialized. The latter two families may be separated by the fact that the throscids have the legs short, but with normal segments (fig. 1), while the melasids have vestigial, or no legs (fig. 2).

The key to the larvae of the elaterid beetles found in Hawaii, which follows, is based upon examination of full grown larvae or of final moult skins of local origin.[2] It should aid in identifying any of the eleven genera (*Melanoxanthus* and *Dacnitus* excepted) known to occur in these Islands. Larval characters in the family Elateridae are excellent for generic separation, and are usually easily distinguished. For specific identification, as in most other insect families, no adequate larval characters are known.

A. More or less depressed forms with a terminal emargination on the 9th abdominal segment (fig. 3); stipes of maxillae contiguous posteriorly, or nearly so; submentum pointed caudad (fig. 4,A); mandibles not dentate ..... B

Cylindrical or subcylindrical forms without emargination at tip of 9th segment; stipes distantly separated by submentum, which, caudad, is broad, not triangular (fig. 5,A); mandibles with a distinct tooth on inner margin ..... E

B. Anal nipple armed with distinct hooks; spines or tubercles present on disc of 9th abdominal segment C

Hooks absent or much reduced on anal nipple; disc of 9th segment without spines or tubercles; margin of the segment with 8 heavily sclerotized, sharp or blunt, upcurved teeth on either side of the emargination, the second on each side distinct, longer than the others, which, cephalad, become progressively reduced, the foremost sometimes obsolete ..... **Drasterius; Conoderus**[3]

* The writer is grateful to Dr. Adam G. Böving of the U. S. Bureau of Entomology & Plant Quarantine for his criticism of the manuscript, and for his suggestions as to certain differentiating characters, particularly in the case of *Chalcolepidius* and *Pyrophorus*.

[1] Böving, A. G., and Craighead, F. C. An illustrated synopsis of the principal larval forms of the order Coleoptera. Ent. Americana, xi (n.s.), 1, 350 pp., 125 pls., Brooklyn, 1930.

[2] J. A. Hyslop's paper (The phylogeny of the Elateridae based on larval characters. Ann. Ent. Soc. Amer., X, pp. 241–263, 10 figs., 1917) is invaluable to any study of elaterid larval structure.

[3] The following is from Dr. Böving:
"Several years ago I tried to discover separating characters between *Conoderus* and *Drasterius* larvae but did not succeed in finding truly reliable ones. This was to a great extent caused by lack of a sufficient material of larvae determined by rearing. . . . However, I shall be glad to mention these separating characters, which perhaps may prove of some systematic value.

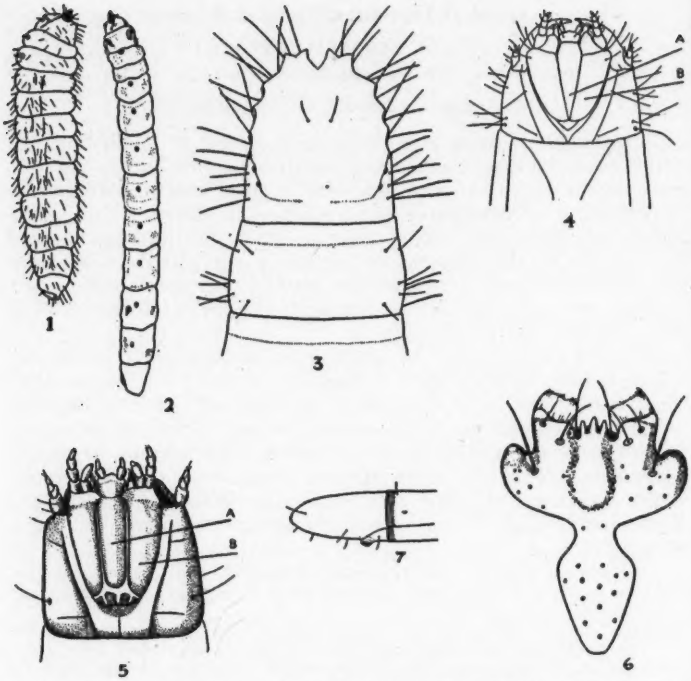

FIG. 1. *Throscus* sp. Larva; lateral view. (From Böving & Craighead, 1930, pl. 81, fig. C.)

FIG. 2. *Melasis rufipennis* Horn. Larva; lateral view. (From Böving & Craighead, 1930, pl. 81, fig. P.)

FIG. 3. *Conoderus exsul* (Sharp). Dorsal view of terminal segments of larva.

FIG. 4. *Conoderus exsul* (Sharp). Head of larva; ventral view; A-submentum; B-stipes.

FIG. 5. *Agriotella bigeminatus* (Randall). Head of larva; ventral view; A-submentum; B-stipes. (After Böving & Craighead, 1930, pl. 86, fig. P.)

FIG. 6. *Agriotes mancus* Say. Nasal plate and front (on dorsal part of head). (From Hyslop, 1917, fig. 7c.)

FIG. 7. *Anchastus swezeyi* Van Zwal. Right side of terminal abdominal segments of larva.

C. Anal nipple with a single large hook on either side; disc of 9th abdominal segment tuberculate; 5 upcurved, acute teeth on either side of terminal emargination progressively reduced anteriorly[4] ....**Lacon (modestus)**
Anal nipple with several hooks on either side ..... D
D. Respiratory tubes of spiracle closely adjacent, straight and parallel; disc of 9th abdominal segment with but two longitudinal furrows
Pyrophorus (bellamyi)
Respiratory tubes diverging, widely separated at base; disc of 9th segment with 4 longitudinal furrows, the inner pair the shorter
Chalcolepidius (erythroloma)
E. Nasal plate unidentate ..... F
Nasal plate tridentate (fig. 6) ..... G
F. Terminal armature of 9th abdominal segment complex, with 4 blunt tubercles, from between which a narrower prolongation projects backward, ending in 3 fairly acute tubercles
Simodactylus (cinnamomeus)
9th abdominal segment unarmored, elliptical (fig. 7); (not congeneric with Anchastus of America) .....**Anchastus (swezeyi)**
G. 9th abdominal segment ending in 2 well-marked truncate projections, with an acute, longer spine between .....**Eopenthes**
Projections and spine of 9th segment greatly reduced .....**Itodacnus**

Lacon modestus (Boisd.), an immigrant species widespread in the Pacific, is found commonly in the drier parts of Oahu, and was once taken near Kawaihae on Hawaii. J. S. Rosa found its larvae under stones on the slopes of Koko Head, Oahu, and was able to rear them to maturity on scarabaeid grubs; the pupal period lasted 52 days.

The larvae of *Chalcolepidius erythroloma* Dej. are found in rotton wood (Aleurites, etc.), in the forests where they are predacious on other insects. This large beetle, known since the seventies of last century from Oahu (and from none of the other islands in the group), is a native of Ecuador. It is common on the Koolau range, and has been taken on the western slopes of the Waianae mountains.

Simodactylus cinnamomeus (Boisd.) is another immigrant widely distributed throughout the Pacific islands. With *Conoderus exsul* it was implicated in damage to sugar cane some years ago, and although it is undoubtedly predacious as well, Vietch[5] says of it

"First: The processes on either side of the anus are low or even absent in *Drasterius*, but plainly projecting or distinct in *Conoderus*.
"Second: There seems to be only a single transverse row of subnasal denticles and the subnasal region anterior to them is smooth and shiny in *Drasterius*, but there appear to be some or many extra denticles anterior to the transverse row of subnasal denticles, and the subnasal region in front is not smooth and shiny in *Conoderus*.
"Third: Tergum of ninth abdominal segment is provided with only one pair of distinct setae *in* or *between* a pair of longitudinal furrows in *Drasterius dorsalis* Say and *Drasterius amabilis* Lec., but there are often (not always) one anterior and one posterior pair of distinct setae between the longitudinal furrows in *Conoderus*. This third character may not be of any value for generic separation because the size, presence, and position of the setae appear much inclined to individual variation, and the character does not always fall in line with the two other characters mentioned."

[4] Dr. Böving points out the following difference between *Lacon* and *Adelocera* larvae, the latter a genus not so far known to occur in Hawaii:
Concavity of hooks facing toward each other and toward the longitudinal middle line of venter .....**Lacon**
Concavity of hooks facing anteriorly .....**Adelocera**

[5] Vietch, R. The white grubs of the sugar cane soils of Fiji. Agr. Rpt. no. 5, Colonial Sugar Refining Co., Ltd., p. 8, Sydney, 1922.

". . . any good it may do is completely outweighed by the tremendous damage it does to young cane plants." Its present importance as a pest in Hawaii is insignificant and in no way comparable to its reported ravages in Fiji.

The two local species of *Conoderus* have both been accidentally introduced here. *C. exsul* (Sharp), a native of Australia or New Zealand, occurs on all the principal islands of the group, and has been known here since at least 1904. It is the commonest of the Hawaiian elaterids, and its predacious larvae are found in bare ground, in sodland, in decomposing filter-press cake, etc. Some years ago it caused economic losses by injuring the eyes of newly planted sugar cane in fields where germination was slow. More recently, partly due perhaps to the substitution of other varieties of cane, such damage has ceased to be important. All things considered, it now deserves the rating of a beneficial insect.

Conoderus eveillardi (Le Guillou) is another predacious immigrant from Australia. It was first taken here in 1931, and apparently is still confined to Oahu. It is fairly common along the coast from Honolulu to Lanikai, the adults coming to lights, and one specimen has been found at Waialua. Mr. Rosa has reared it from larvae found in sandy soil at Waimanalo beach.

A specimen of the North American *Drasterius mellilus* var. *comis* (Le Conte)[6] was taken at Nanakuli, Oahu, in 1933, but has not been found since. It might easily be concealed in shipments of vegetables from the mainland, and its establishment here is doubtful. Its larva is unknown to me, but it will certainly prove to be smaller than either of the Hawaiian *Conoderus,* and the characters suggested by Dr. Böving (footnote 3) should distinguish it from that genus.

Of the endemic genus *Eopenthes* there are probably 32 distinct species. So far as they are known, their larvae all live in more or less decayed forest wood, and some of them are certainly predacious. The same is true of the nine species of the endemic genus *Itodacnus.*

Anchastus swezeyi Van Zwal. is an endemic species known so far only from the windward forest slopes of Haleakala above Nahiku, Maui. The larvae have been found in dead *Clermontia macrocarpa* Gaud., an endemic lobeliaceous shrub, but nothing is known concerning their food habits. Comparison of its larva with that of *Anchastus sericans* Candèze, both loaned me by Dr. Böving, makes it clear that *swezeyi* is not congeneric with the California-Arizona species. Whereas in *swezeyi* the ninth abdominal segment is unarmored and smoothly elliptical (fig. 7), in *sericans* this segment is heavily and complexly armored in a way suggestive of *Simodactylus;* so great a difference in larval structure makes it impossible

[6] According to W. J. Brown, Studies of the Elateridae (Coleoptera)—I, Canad. Ent., lxv, p. 133, 1933, *Drasterius mellilus* (Say) is the correct name for the insect commonly known as *D. dorsalis* (Say).

that the two are members of the same genus. The single larva of *swezeyi* available for examination has the nasal plate partially obscured; it is definitely not tridentate, but appears to be unidentate, and is so placed in the dichotomous key. In any case, the larva of *swezeyi* cannot be confused with that of any other species now known in these Islands. The only adult difference discernible between *swezeyi* and its Pacific congeners on the one hand, and the North American species of *Anchastus* on the other, is that in the former the first segment of the hind tarsus is as long as, and usually decidedly longer than, the four following segments together, whereas in the several American species which I have seen, the first hind tarsal segment is usually markedly shorter than the four following. *A. swezeyi* certainly, and perhaps all the other *Anchastus* from the Pacific islands as well, should properly be placed in a new genus.

In 1934 large numbers of larvae of *Pyrophorus bellamyi* Van Zwal., reared from individuals introduced from the Pacific slope of Guatemala, were released in Anomala-infested sugar cane fields in the Pearl Harbor region of Oahu. Should it be recovered in the future, the characters given in the key will serve to distinguish it from the somewhat similar larva of *Chalcolepidius*.

The larvae of *Melanoxanthus* and of *Dacnitus* have not yet been recognized. The former genus is represented here by the widely distributed immigrant *M. melanocephalus* (Fabr.). Abundant as this species often is on all of the principal islands of the group except Kauai, occurring in the drier regions, its larva has not yet been found; whether it inhabits soil or decaying wood, or has another more specialized habit, is not known. Only two specimens of *Dacnitus* have ever been collected; these were adults of *currax* Sharp taken on muddy soil under stones and logs at Kokee, Kauai, in the mountain forest. The larva of this native species remains to be discovered.

Biological Studies in Hawaiian Water-Loving Insects

PART III

Diptera or Flies

B. ASTEIIDAE, SYRPHIDAE AND DOLICHOPODIDAE

BY FRANCIS X. WILLIAMS
Experiment Station, H.S.P.A.

(Presented at the meeting of December 1, 1938)

FAMILY ASTEIIDAE

Stenomicra orientalis Malloch (Plate 14)

Malloch, J. R., Ann. and Mag. Nat. Hist. XX (9), pp. 24–26, pl. II, figs. 8 and 9, 1927 (male and female).

This is a pale yellow, blackish and brown fly, rather slender and measuring up to about two millimeters long (fig. 1). It seems widely distributed over the lowlands to moderate elevations in the Islands wherever suitable conditions for its subaquatic larva occur. The earliest record of its capture is 1908 (O. H. Swezey), on the Islands of Hawaii and Oahu. It has been very generally taken on sugar cane, within moisture-retaining spindles or leaf bases of which the larva probably breeds. More recently, *Stenomicra* has been associated with other kinds of monocotyledonous plants, and data on its biology thereby secured.

This active fly is remarkable for its manner of progression. We usually find it on the upper or inner surface of a long and more or less vertical leaf, as that of sugar cane (*Saccharum*), pineapple (*Ananas*), or hala (*Pandanus*). Here it will run forward, then, facing the same direction, run sidewise or retreat and then advance, so as somewhat to describe the letter U. This erratic behavior may be supplemented by a lifting and lowering of the abdomen, and thus, of the rather long overlapping wings, the whole procedure recalling somewhat the movements of certain tiny chalcidid wasps.

Early in 1932 the writer secured from Mr. O. H. Swezey two *Stenomicra* larvae that were found at the water-holding leaf base of Job's Tears (*Coix lacryma-jobi* Linn, Gramineae) (Proc. Haw'n Entom. Soc., VIII, p. 223, 1932). One adult was reared. Late in 1938, while in the fore hills of Punaluu Valley, Oahu, I chanced upon some young pineapple plants (*Ananas sativus* Schultes, Bromeliaceae) growing among tall grass and weeds. This plant harbors between its inner leaves the early stages of the ceratopogonid midge *Apelma brevis* Johannsen (see Illingworth, J. F., Proc. Haw'n Entom. Soc., VIII, pp. 541–543, 1934). Specimens of these evidently neglected bromeliads were taken, then and later, to the laboratory for examination. Besides numerous larvae and

some pupae of *Apelma*, a few larvae of *Stenomicra* were found in the watery fluid usually present between the close-set inner, or near-inner leaves. In January 1939, a few young plants of the screw-pine or hala (*Pandanus tectorius*) that were not yet sufficiently grown to show the spiral-like leaf arrangement, were secured from Manoa Valley, Honolulu, and dismembered leaf by leaf—an unpleasant task because of the sharp marginal spines. The tough outer and more gaping leaf-bases often accumulated quantities of such debris as decaying leaves, portions of guava fruit and wet soil-like materials. Among the small invertebrates found in this environment were a flat sluggish mite, Crustacea, and the larva of our common spotted-wing cranefly *Limnobia perkinsi* (Grims.). As the paler, more close-set inner leaves were reached, coarser debris was excluded and the adhering droplets of moisture were more or less bereft of foreign substances and organisms became fewer. Towards this central portion, in or about the droplets, a few *Stenomicra* larvae were found. More rarely the larva occurred at the rather less favorable leaf bases, well towards the center of the tuft-like head, of the common Ti plant (*Cordyline terminalis* Kunth, Liliaceae). From these few investigations it seems probable that this fly also breeds at the leaf bases of still other plants here and of which several appear suitable.

The egg of *Stenomicra* (fig. 2) is long oval, flattened and about 0.65 mm. long. It is dead white and shows a fine cross-hatched sculpture. The very few found in the field had been laid singly and glued for their length to the surface of the leaf quite a distance above its base. The larva (fig. 3) is flattened, and, except for the blackish head skeleton and the gut content, is semi-transparent glassy white. It is provided with some short setae and transverse rows of very fine ventral spines on more or less obvious swellings or pseudopods. The head is retractile, the thoracic spiracles very small and three-fingered and the longitudinal tracheae terminate as spiracles in the forked caudal process. It is quite unable to swim, but when within a droplet of water will move its body in a vigorous undulating manner. It can creep caterpillar-like and, as with certain other subaquatic larvae often swallows air. It appears to be of scavenger habit. When ready to pupate it crawls some distance away from the leaf base, becomes firmly fixed to the leaf, the skin hardens and adds a keel to its otherwise flattened dorsal sur-

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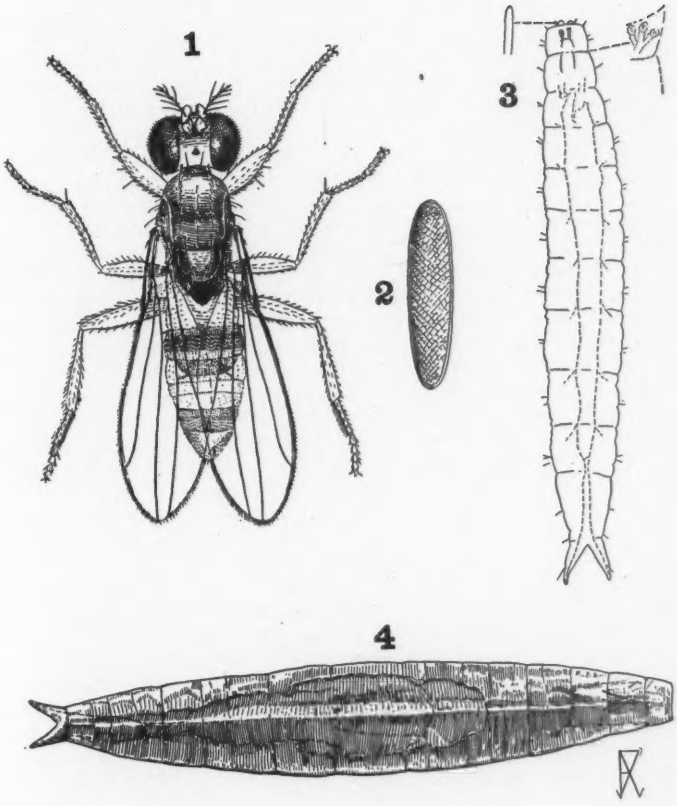
STENOMICRA ANGUSTATA

Explanation of Plate 14

1. Adult. Length to tip of wings 2.25 mm. On pineapple plant, Punaluu, Oahu.
2. Egg, dorsal view. Length 0.65 mm.
3. Larva. From base of leaves of pineapple plant. Punaluu, Oahu.
4. Puparium showing in outline the pupa within. Length 5.20 mm. From inner leaf surface of young Pandanus plant. Manoa Valley, Oahu.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face. As the pupa is formed the withdrawn larval head skeleton remains well to the front. The yellowish orange pupa (as outlined in fig. 4) is only about half the length of its container. When about to issue, the fly frees itself from the delicate pupal envelope and, working its way to the fore-end of the scale-like puparium forces apart fissure-like the upper and lower portions of the first one or two segmental divisions and crawls through this opening.

The genus *Stenomicra* is represented by very few species. Malloch (*l.c.*, pp. 23–26, pl. II, 1927) gives a key to the four species, three of which are described as new. *S. angustata* Coquillet was described from Porto Rico; *S. australis* Malloch from Queensland, Australia. The author figures its puparium that was found on a banana leaf and resembles that of our local species. *S. fascipennis* is from Luzon, Philippine Islands.

FAMILY SYRPHIDAE

This extensive family of often large and showy flies is represented in the Hawaiian Islands by only 11 species, all of which are probably recent to very recent immigrants, and several of wide distribution. Five of these 11 species may be considered as passing their larval stages in a more or less watery medium, with a sixth species, *Syritta oceanica* Macq., partial to wet decaying plant tissues, somewhat on the borderline.

Volucella obesa (Fabr.) is a large compact, brilliantly metallic bluish green species. It often breeds in thick foul bodies of water, in rotten cactus stems (Swezey, O. H., Proc. Haw'n Entom. Soc., VIII, 28, 1932), sisal juice (Weinrich, W., *id.*, I, p. 25, 1906), filter press mud (Williams, F. X., *id.*, VIII, p. 233, 1933), etc., while Illingworth (*Id.*, p. 83, 1915, & VII, 252, 1929) found it in living papaya stems as well as in a decayed one. The fly attaches a mass of white eggs to a blade of grass or other suitable object near the source of larval food. Both larvae and pupae have relatively short posterior breathing tubes.

Volucella pusilla Macq. is a more recent immigrant, having first been collected here by J. S. Rosa in 1930. It is smaller than *V. obesa* and chiefly brown and yellow with marked wings. Mr. Swezey found it breeding in decaying stems of *Opuntia* and *Hylocereus* cacti. The writer found larvae of this insect breeding in the liquid of decaying pieces of *Opuntia,* on the summit of Koko Crater, Oahu.

Eristalis tenax (L.) the common drone, or drain fly is a large brownish bee-like species. It is not very abundant in Hawaii, where it favors the cooler elevations. Of this insect, G. H. Verrall (Platypezidae, Pipunculidae, and Syrphidae of Great Britain, London, 1901, on p. 674) comments, as follows: "The common *Eristalis tenax* is essentially the 'Drain Fly' of the whole world, as it has followed all over the world what civilization has considered

its improved sanitary arrangements of drainage, and it has been very interesting to watch the lines of route and the length of time that it has taken to arrive at new localities (*v.* page 508)." Its rat-tailed maggot has a breathing tube that is extrusile for a length of several inches. This species was well known to the ancients. And about two centuries ago R. H. Reamur published his classical memoir upon this fly. For a very readable account, with illustrations of *Eristalis tenax* the reader is referred to L. C. Miall's "The Natural History of Aquatic Insects," 1895: London and New York. Good figures of the early stages of this insect are also found in C. L. Metcalf's "Life-Histories of Syrphidae, V." (Ohio Naturalist, XIII, No. 5, on Pl. V.)

Lathyropthalmus* arvorum (Fabricius) (Plate 15)

Syrphus arvorum Fabricius, Mantissa Insect., II, 335. 16. 1787.

This shrill-humming bee-like fly with black-striped thorax measures up to about half an inch long (fig. 5). It is widely distributed in Indo-Malaya and Australasia. First taken in the Hawaiian Islands in 1900 (Grimshaw, P. H., Diptera, supplement: Fauna Hawaiiensis, III, pt. 2, 1902, on p. 82, as *Eristalis punctulatus* Macq. Honolulu), it is an abundant and conspicuous insect of our lowlands. In the male fly the immense compound eyes meet broadly at the top of the head.

Of the early stages of this insect, F. W. Terry (Hawaiian Forester and Agriculturist, III, 2, 1906, on p. 39, cited as *Eristalis punctulatus*) writes as follows: "The larva is aquatic, living in stagnant and foul water, feeding upon stable refuse or decaying vegetation, around which the female flies may frequently be observed depositing masses of white slender eggs. The whitish larva is maggot-like and semi-translucent, the digestive and other organs being easily visible through the tough skin; it belongs to that type known as "rat-tailed," since it possesses a very long and protusile breathing-tube, which is capable of being extended for nearly two inches; by this means the larva can remain hidden in the submerged mud and continue its respiration unchecked."

It is also known to breed in pineapple and sisal refuse (Bridwell, J. C., Proc. Haw'n Entom. Soc., IV, 360, 1919) and in filter-press mud used in sugar cane fields (Williams, F. X., Proc. Haw'n Entom. Soc., VIII, 233, 1933), in pools rendered foul with decaying guavas, in sewage, etc.

The egg is whitish, rather elongate and adorned with tiny oblong areas (fig. 8). The micropyle is at the narrower end. It measures about 1.35 mm. In a few days it hatches, the larva being immediately of much greater apparent bulk than its recent container (fig. 9). There are short bristles at the head end and very sparse

* *Lathyropthalmus* (Mik, J. Wien Entom. Zeitg., 16, pp. 114–115, 1897) is regarded by Mik and some others as a subgenus of *Eristalis*.

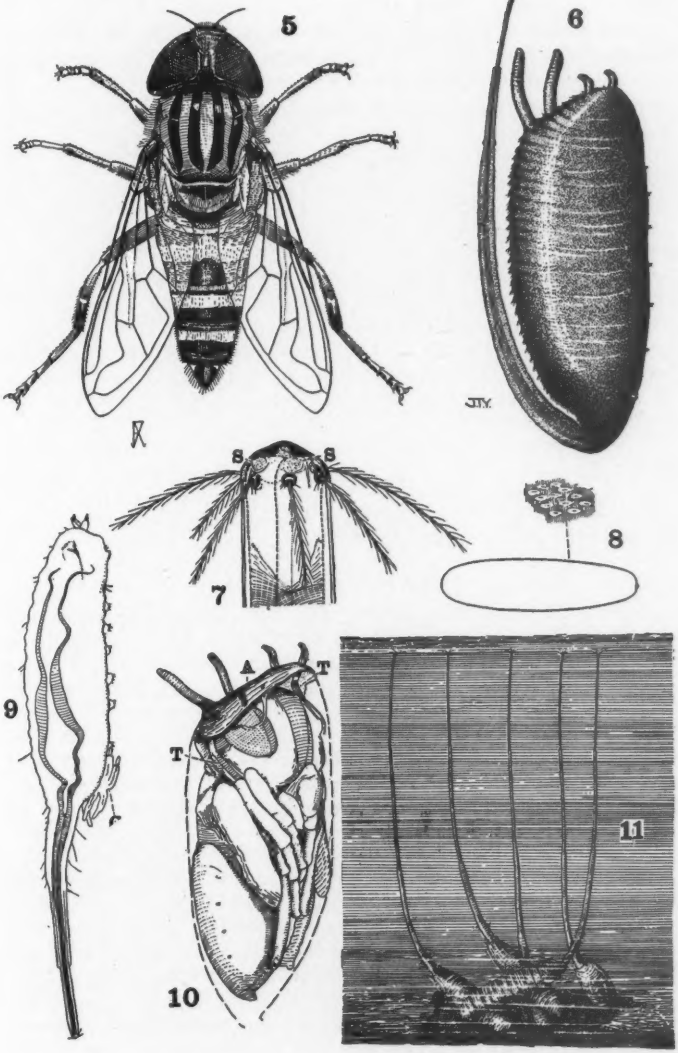
fine hairs rather generally, on the body. The short though obvious antennae are situated above the generous mouth and seven pairs of hook-armed pseudpods, the first pair well forward, are present on the underside of the body. The silvery longitudinal tracheae, swollen reservoir-like near their middle length lead into the telescopic breathing tube that terminates in spiracles. As the larva increases in size and moults it assumes a more hirsute and transversely wrinkled appearance, and a pair of short dark horn-like spiracles appear at the head end. Full fed, it may be 20 mm. long exclusive of the tail that is extrusile to 50 mm. or more (fig. 11). Well behind the functional anterior spiracles and approximately above or opposite the second pair of prolegs is a pair of ringed circular areas. Here in the puparium will protrude the larger pair of thoracic horns or spiracles. The rather thick basal portion of the tail is wrinkled, hairy, and even papillose; beyond, it becomes more slender and bears many fine spinules, and finally it terminates as a thread like tube wherein two longitudinal tracheae are plainly visible. These lose their tracheal character just before the extremity of the tube. The extremity is surrounded by 8 short-fringed hairs above the base of which are the spiracles or breathing pores (fig. 7, SS). These fringed hairs form a coronet that rests upon and depresses somewhat basin-like, the surface film of water and exposes the spiracles to the air.

The *Lathyropthalmus* larva is hardly able to swim, and when lifted out of its liquid environment is about as flabby, I should imagine, as a stranded whale, though not as helpless. It can, however, creep along with caterpillar-like undulations. When time for forming the puparium is at hand the larva seeks firmer ground, in captivity crawling well up or out of a jar. Now the skin soon hardens, darkens and contracts into a leathery case from the fore end of which, horn-like, the two pairs of respiratory processes, connecting within the tracheae, will protrude (fig. 10). In two out of six puparia formed under laboratory conditions only the more anterior or smaller pair of respiratory processes were formed. In issuing, the fly pushes off the fore end of the puparium.

LATHYROPTHALMUS ARVORUM

EXPLANATION OF PLATE 15

5. Female fly. Length 12.5 mm.
6. Puparium, from side. Greatly enlarged.
7. Extremity of respiratory tube of last stage larva showing tail coronet, that consists of 8 fringed hairs. S.S., spiracles. The two tracheal tubes are represented by broken lines. Greatly enlarged.
8. Egg and detail of its sculpture. Length 1.35 mm.
9. Larva in first stage, side view. G, anal gills. Greatly enlarged.
10. Pupa, with all but the anterior end (A) of envelope or puparium removed, the rest being represented by broken lines. T.T., tracheae leading from the respiratory horns. Length of pupa 8.8 mm.
11. Group of last stage larvae with their respiratory processes so extended as to reach the surface of the water. These tubular processes measure about 2 inches. Enlarged.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An ichneumonid wasp, apparently of the genus *Phygadeuon,* has been reared from the puparium of this syrphid found in filter-press mud near Hilo, Hawaii. (Williams, F. X., Proc. Haw'n Entom. Soc., VIII, p. 233, 1933.)

I am indebted to Mr. F. K. Lee, manager of the anti-mosquito league here, for specimens of the larva of this fly as well as for considerable other aquatic material.

Lathyropthalmus aeneus (Scopuli) is bronzy black with several thin gray thoracic stripes. It was first recorded here in 1919 by H. T. Osborn (Proc. Haw'n Entom. Soc., IV, pp. 329, 339, 1920) from a dead specimen taken at a window by O. H. Swezey. It is widely distributed in Europe and in North America. Little or nothing seems to be known of its early stages here. In Ohio, C. L. Metcalf has worked out the life-history and given excellent illustrations of its various stages. (The Ohio Naturalist, XIII, No. 5, on pp. 84–89, and pl. IV, figs. 149–150, pl. V, figs. 145–148, 1913.) The larva which has a breathing tube capable of considerable elongation, occurred in sewage, and, "These larvae can progress through the water by undulatory constrictions of the body, or creep over submerged or exposed objects by the aid of their prolegs" (p. 87).

Trichogramma japonicum Ashm., a minute parasitic wasp imported from Japan has been bred by D. T. Fullaway from eggs of one of our larger syrphids. These eggs suggest those of a *Lathyropthalmus.* The eggs were found on a rice stem (Proc. Haw'n Entom. Soc., IX, 373, 1937).

FAMILY DOLICHOPODIDAE

This large family of carnivorous flies comprising about 100 described Hawaiian species nearly all of which appear to be native insects has only recently been given much attention. Most of the species are described from the Island of Oahu, and when the other large Islands of the Archipelago have been adequately explored for these insects their number might well be doubled. The Dolichopodidae are often, or perhaps usually, metallic green, blue or bronzy flies, though many of the Hawaiian species are relatively dull colored. Their ecology, or relation to environment, is of great interest. Some of our species have a wide range while others have a very specialized habitat. The two species of the Hawaiian genus *Emperoptera* have undeveloped wings and are thus unable to fly though active jumpers. Dolichopodid larvae are carnivorous, cylindrical tapering at the poorly developed head and nearly truncate at the lobed posterior end. A cocoon is formed. The pupae have well developed often very long thoracic respiratory processes.

Certain species may be classified as definitely beneficial. The larva of *Medetera* has been found attacking beetle borers. An excellent account of such a species is that by Donald De Leon entitled

"A Study of Medetera aldrichii Wh. (Diptera, Dolichopodidae), a Predator of the Mountain Pine Beetle (Dendroctonus monticolae Hopk., Coleo-Scolytidae)" (Entom. Americana, XV, pp. 59–92, 4 pls., 1935).

The adults of several species of the genus *Dolichopus* are sometimes effective destroyers of mosquito larvae and pupae, as observed by S. C. Bishop and R. C. Hart (Notes on Some Natural Enemies of the Mosquito in Colorado; Journ. New York Entom. Soc., XXXIX, pp. 151–157, 1931). These two authors also refer to Howard, Dyar and Knab in, The Mosquitoes of North and Central America and the West Indies, I: 170, 1912, where they ". . . record the capture in Panama, of mosquito larvae by flies of the family Dolichopodidae but the species involved were not determined."

Dolichopodidae are among the numerous kinds of flies captured by our Hawaiian crabronid wasps. For example, *Melanocrabro discrepans* Giffard of the Island of Kauai has been found storing its tunnel in a tree stump with a submetallic greenish dolichopodid, evidently a new species of the genus *Eurynogaster*.

The principal systematic papers on Hawaiian Dolichopodidae are chiefly of recent date. The earlier descriptions are mainly by P. H. Grimshaw in Fauna Hawaiiensis, III, Pt. 1, and III, Pt. 2 (Suppl. to Diptera), 1902; *Dolichopus exsul* was described by J. M. Aldrich in Proc. U. S. Nat. Museum, 61, No. 2446, 1922, on pp. 15 & 16; P. H. Timberlake, in Proc. Haw'n Entom. Soc., V, 190, 1923, lists several genera and a species; J. R. Malloch describes several species, of *Campsicnemus* from Oahu and gives a key to the Hawaiian species of that genus in Stylops, I, pt. 6, 1932, on pp. 121–124; M. C. Van Duzee, in Proc. Haw'n Entom. Soc., VIII, pp. 307–357, Pls. 22–25, 1933, monographed the Hawaiian Dolichopodidae, describing two new genera and many new species; finally, Abbe O. Parent described one new Hawaiian genus and several new species in Mem. de la Soc. Nationale des Sciences Naturelles et Mathematiques de Cherbourg, Tome XLI, pp. 257–308, Expl. of plates and Pls. 67–79, 1934; other papers by Abbe O. Parent are: Dipteres Dolichopodides, Espèces et Localités. Bull. et Ann. de la Société Entom. de Belg., LXXVII, pp. 125–148, 1937; Quelques Dipteres Dolichopodides de Iles Hawaii, Konowia, XVI, Pt. 1, pp. 67–84, 17 Figs., 1938; Idem, Pts. 3 & 4, pp. 208–219, 14 Figs., 1938, and Proc. Haw'n Entom. Soc., X, 2, pp. 225–249, Figs. 1–42, 1939. Many new species are described in these papers. Some other contributors to the knowledge of Hawaiian Dolichopodidae are: E. H. Bryan, Jr., in A Review of the Hawaiian Diptera, with Descriptions of New Species, Proc. Haw'n Entom. Soc., VIII, pp. 399–468; F. X. Williams, Proc. Haw'n Entom. Soc., X, pp. 120–129, 2 pls., 1938; E. C. Zimmerman, Proc. Haw'n Entom. Soc., X, pp. 145–148, 1938 (Emperoptera from Maui (Diptera, Dolichopodidae)).

A brief review of the Hawaiian Dolichopodidae is given by Dr. R. C. L. Perkins, in Fauna Hawaiiensis, I, Introd. on p. clxxxiii, 1913.

Among the American papers on the early stages of Dolichopodidae are: Malloch, J. R. A preliminary classification of Diptera, exclusive of Pupipara, based upon larval and pupal characters, with keys to imagines in certain families; Part I. Illinois State Lab., Nat. Hist. Bull. 12 (1915–17), 161–410, 1918; Johannsen, O. A., Cornell Univ. Agric. Exp. Sta., Aquatic Diptera, Pt. II. Orthorrhapha—Brachycera and Cyclorrhapha; Mem. 177, pp. 1–62, Pls. I–XII, 1935. Other references are found in the text.

Campsicnemus Walker (Plate 16)

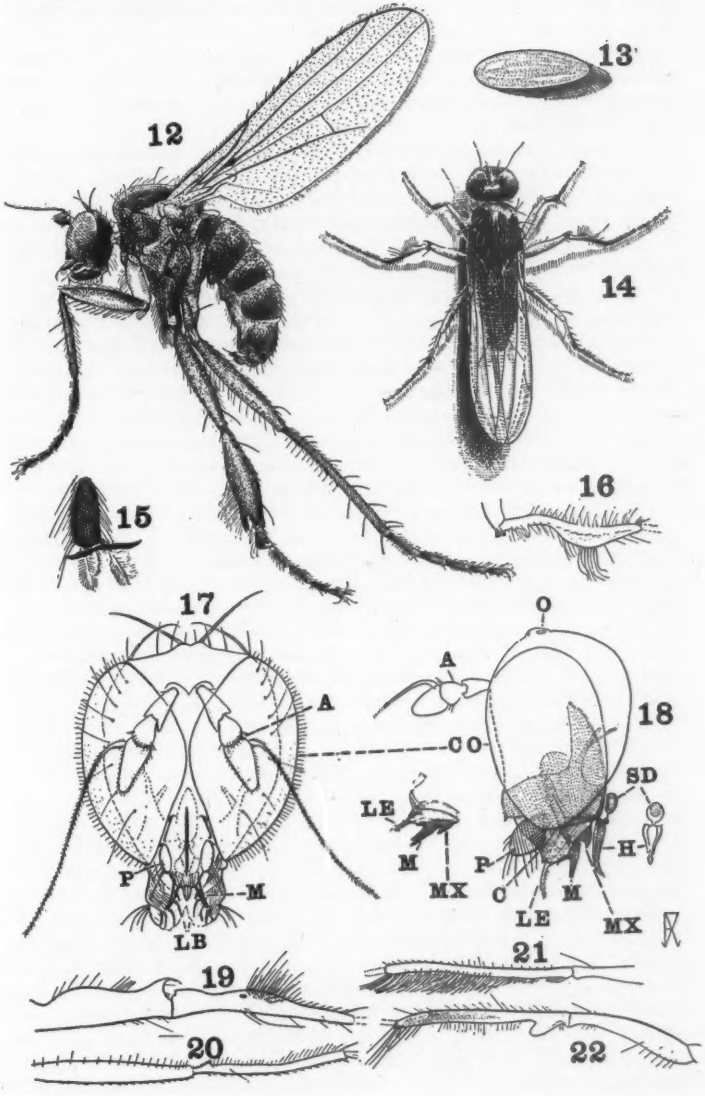
Walker, Insecta Brittanica, Dipt., I, 187, VI (1851).

The widely distributed genus *Campsicnemus* thus far includes about 50 Hawaiian species or over half of our described Dolichopodidae. These consist of mainly dull-colored flies (the top of the head is often of a metallic hue) representing several different forest environments. Many species occur on paths or on the leaf-littered forest floor, others walk or skate upon the surface of puddles or stream pools, others still are found on the leaves of plants where they may be exposed to sunlight. Finally, in very humid regions a small number patronize the stems of bananas (*Musa*) and of other plants. Of those found on the forest floor nearly all are brownish, some few being in part whitish while one or two are practically all whitish. Those on the surface of the water are brownish to black, the several associated with high lights and green leaves are in great measure metallic green or bluish. A few brown or more or less brilliant species may be found on the stems of plants. Much further study, however, on these insects is needed to more accurately establish their ecological relationships.

CAMPSICNEMUS

Explanation of Plate 16

12. *Campsicnemus miritibialis*, male--Oahu.
13. *Campsicnemus* sp., egg of a water-riding species. Length 0.46 mm. Oahu.
14. *Campsicnemus williamsi*, male. Length to tip of wing, 4 mm. Oahu.
15. *Campsicnemus miritibialis*, last tarsal joint.
16. *Campsicnemus sinuatus*, mid-femur. Nauhi, Hawaii.
17. *Campsicnemus* sp., head. Oahu.
18. *Campsicnemus* sp., head, side view, with labella removed.
    Explanation of Figs. 17 and 18: A, antenna; C, clypeus; CO, compound eye; H. hypopharynx; LB, labella; L-E, labrum-epipharynx; M, mandibles (these can move laterally); MX, maxillae; O, ocelli; P, maxillary palpus; SD, receptacle of salivary glands.
19. *Campsicnemus williamsi*. Male, mid femur. Oahu.
20. *Campsicnemus grimshawi*. Male, mid femur. Nauhi, Hawaii.
21. *Campsicnemus* sp. Male, mid femur. Nauhi, Hawaii.
22. *Campsicnemus gloriosus*. Male, mid femur. Oahu.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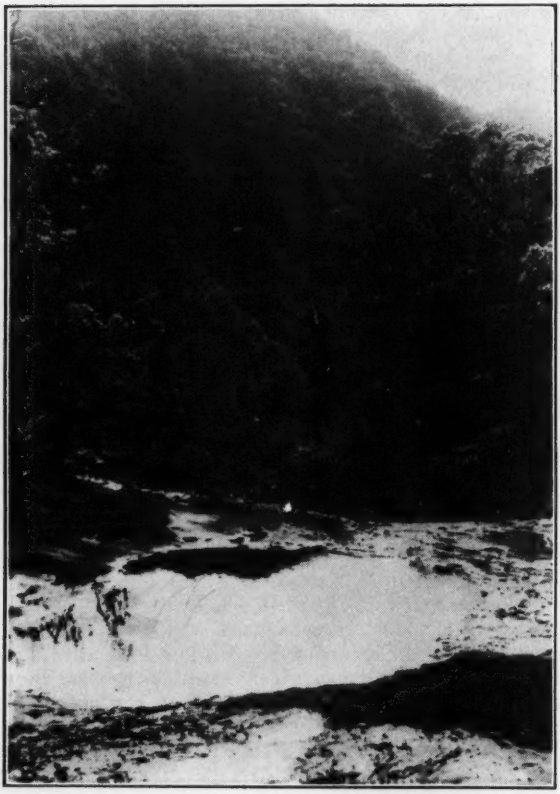
In the Proceedings of the Hawaiian Entomological Society, VIII, on pp. 307–309, 1933, in the preface to an extensive paper by M. C. Van Duzee on "New Dolichopodidae from the Hawaiian Islands," I have given a short account of some of the habits of a few *Campsicnemus*. Since then I have added but little relative to these numerous flies. As usual, the observations that follow have been made chiefly on the Island of Oahu.

At least 16 species of Hawaiian *Campsicnemus* are known to disport themselves upon the surface of water. Such waters include mud puddles, canyon pools and the quieter parts of streams. None appear to have been found here on lowland reservoirs nor yet on brackish waters. Proficiency upon the surface film varies with the species. Some, standing rather high on their legs walk briskly on or run over the water, readily turning about when something attracts them from the rear, others travel more quickly, while the most adept of all skate, with middle legs more extended, with a speed that is hard to follow. Progress is commonly aided by a flick of the wings or even a short flight. In general, I would state that the less skilful water-riders occur upon mere puddles and little, more or less disconnected pools—or failing these temporarily, are content with wet ground, while the accomplished skaters are found upon the more permanent streams. In the first group at least, there are often two species found upon the same little body of water. One of these is almost sure to be the small *C. gloriosus* V. D. (fig. 22; mid femur and tibia). And in this group I have occasionally seen a *Campsicnemus* fly overtake the young of the common little water-running bug *Microvelia vagans* (White) but never seriously to attack it. The larger collembolous insects often found upon the water seem generally to be pursued in vain. Insects like some of our native psyllid bugs, *Trioza iolani* Kirk., for example, may fall and drown in the water and are then fed upon by the flies. Hence, their food may consist largely of non-aquatic insects and is to that extent of an accidental nature. But in the second group the flies are larger and swifter; collembolous insects too large for the smaller *Campsicnemus* flies often fall a victim to them and, in addition, a more natural and dependable source of food is to be found in the several species of midges that breed in the more permanent streams. At Nauhi, Hawaii, situated about a mile high on the slopes of Mauna Kea, *Campsicnemus tibialis* V.D. moves quite skilfully over the surface of pools of the little stream there. This species also occurs at much lower levels. *C. bicoloripes* Parent, of Oahu, is found rather widely distributed at 2000 feet elevation, or less along the Koolau Range. It is a dark vigorous species that skates swiftly in areas often in the shelter of boulders and where also there may be a perceptible current. Such a habitat is the Kaluanui stream. It was found also on small pools that constituted the very headwaters of a little stream flowing into Manoa Valley. At Kokee, Kauai, at an elevation of

over 3000 feet *C. nigricollis* V.D. is a fine performer upon mountain streams. This insect was first collected by H. T. Osborn in 1919.

Thus far not found on the windward side of the Koolau Mountains, Oahu, but observed only on some of the streams in the immediate vicinity of Honolulu, is *Campsicnemus miritibialis* V.D. This is a relatively large dusky species that measures up to nearly 3 mm. in length of body (figs. 12 and 15). Because of his greatly thickened, spurred and tufted mid-tibiae, the male may be recognized even as he courses swiftly over the surface of the water. This fly is by far the best performer of all the water-loving *Campsicnemus* observed on Oahu. The only other aquatic insects that may exceed it in swiftness are the large erratic *Telmatogeton* midges that half fly and half run over the water. Employing the middle pair of legs and aided also by the shining flicking wings *C. miritibialis* propels itself in sometimes almost invisibly swift and graceful gyrations. It is also capable of leaping in the air a short distance. Very often it courses over a more or less restricted beat—frequently the head of a little pool where there may be a gentle current. When one fly encounters another on such a beat there is usually an extremely rapid though brief scuffle. Sometimes the flies occur in rather loose crowds of perhaps two or three dozen, and then moving less swiftly, two or three specimens may be captured at one time by quickly placing a wide-mouth jar over them. Even inclement weather, such as often prevails in the mountains, may not altogether prevent their activities. In numerous field studies I located a number of "roosts" where these flies habitually retired. A fly swiftly approaching a certain rock ledge or depression in a steep dripping bank, would run up the slope a few millimeters, or reach it by a low heavy flight, and then usually turn head downwards. Both sexes were thus to be found, including individuals that were consuming their prey. Flies that I disturbed would dash away wildly, often to return at the same quick pace. I have in mind a tiny bayou of a pool in the Lulumahu stream at an altitude of about 1750 feet. Part of this shallow pocket was bounded by a rocky vertical wall some three or four inches high. Here over a period of several years this water-skater was observed roosting. The pool (Text fig. 1) situated just above a 30-foot waterfall was fed at one side as well as at the far end by a gentle and very shallow flow over sloping rock. Subaquatic moss, and green and brown algae were prominent on this rock slope, and numerous *Scatella* flies (Ephydridae) and green *Tanytarsus* midges and dusky little *Dasyhelea* ones bred in this medium. *Campsicnemus* patrolled the placid water below, sometimes lazily maintaining themselves against the wind or slight current or moving swiftly over the surface. Occasionally a *Scatella,* newly hatched, quite lacking in energy and with wings still in a crumpled undeveloped condition, would float onto the pool from the rocky slope. The alert *Campsicnemus* stationed towards the inflow appeared to heed this help-



TEXT FIG. 1. Pool along the Lulumahu Stream, Koolau Mts., Oahu at an elevation of about 1750 ft. This pool is just above a 30-ft. waterfall and is much favored by the dolichopodid fly, *Campsicnemus miritibialis*.

less insect little or not at all—according to my very few observations. But *Tanytarsus*—the pupal shells of which were common among the algae—though developing with great rapidity and soon taking wing, very frequently alighted once or twice at short intervals, and thus progressing down current was sometimes carried on to the pool and there immediately seized, before it could essay another flight, by its dusky enemy. *Campsicnemus miritibialis* bears this prey in its mouth, feeding while skating swiftly or, retiring to a roost, consumes it at leisure. Similarly, in the rocky bank of an upper pool several little depressions glistening with water might

harbor individuals that were merely resting or consuming *Tanytarsus* midges. The tiny ceratopogonine fly, *Dasyhelea hawaiiensis* Macfie and certain insects that fall into the water are also devoured by this fly. Near the base of a waterfall in Manoa Valley, the rather large and active springtail *Salina maculata* Folsom, leaping or falling into the water were often, after a considerable chase, captured and eaten by *C. miritibialis*. It seems ever on the lookout for prey, and even passing air bubbles may be examined.

Thus far, the early stages of this dolichopodid remain unknown. Fine algae and other plants were scraped off its roosts and examined. Very fat-bodied females frequently rested on wet rocky concavities from a few millimeters to several centimeters above the water line, but no ovipositions were seen. Such flies were also confined in tubes or jars provided with wet algae, etc., with negative results. Dissections showed that turgid females did contain many eggs. Apparently well developed eggs much resemble those of smaller water-riding *Campsicnemus* (fig. 13), or of the arboreal *C. fumipennis* Parent, and measured 0.5 mm. long. A single very young larva with posterior armaments much like those of first-stage larvae of *Eurynogaster minor* Parent, was dissected out of fine algae secured from a tiny water-saturated cave along the Lulumahu stream (Text fig. 2) and where only *C. miritibialis* was observed

TEXT FIG. 2. Lulumahu Stream at about 1750 ft. Where the dripping wet rock bank touches the water and a little to the left of the middle of the picture is an indention or tiny shallow cave, a favorite roost for *Campsicnemus miritibialis*.

roosting. Early in February, 1939, "traps" consisting of metal screen bags filled with algae, old vegetation, etc., were fastened against several "roosts" so as to be partly submerged, along the above stream. When visited more than two months later these bags had been swept away in winter floods. It is hoped that eventually the life-history of this interesting fly will be worked out. This has been done to some extent for the genus with *C. fumipennis,* patron of banana stems (Proc. Haw'n Entom. Soc., X, pp. 120–126, Pl. X, 1938).

I have a single record of rearing *Campsicnemus gloriosus* (Proc. Haw'n Entom. Soc., VIII, pp. 308–309, 1932). Females were induced to lay their smooth long-oval, pale brown eggs on wet cotton stoppers. But other females were enclosed in a jar containing very wet mud, moss and plant stems harboring such animal life as tiny worms and copepod Crustacea, this material being from a locality some distance removed from that in which the flies were captured. Over five weeks later a male *C. gloriosus,* probable progeny of one of the enclosed females issued from the mud.

The following is a list of Hawaiian *Campsicnemus* known to frequent the surface of water:

C. bicoloripes Parent. Koolau Mts., Oahu.
C. concavus V.D. Koolau Mts., Oahu.
C. crinitibia V.D. Waianae Mts., Oahu.
C. gloriosus V.D. Oahu.
C. grimshawi V.D. Nauhi, Hawaii, 5000 ft.
C. miritibialis V.D. Koolau Mts., near Honolulu, Oahu.
C. nigricollis V.D. Kokee, Kauai Mts.
C. obscurus Parent. East Molokai Mts.
C. obtusus V.D. Mt. Kaala, Oahu.
C. octosetosus V.D. Kahana, Oahu 2000 ft.
C. simplicipes Parent. East Molokai Mts.
C. sinuatus V.D. Nauhi, Hawaii, 5000 ft.
C. spinitibia V.D. Nauhi, Hawaii, 5000 ft.
C. tibialis V.D. Nauhi, Akaka Falls, Hawaii.
C. williamsi V.D. Oahu, both ranges.
C. sp.?. Nauhi, Hawaii, 5000 ft.

Further collecting will probably more than double this number.

Of other genera of Hawaiian Dolichopodidae that frequent wet places are two very adaptable, more or less metallic greenish species, namely, *Dolichopus exsul* Aldrich and *Syntormon distortitarsis* V.D. Both may range from near the seashore to well into the mountains. *Dolichopus exsul,* one of the apparently few tropical species in a large and widespread genus occurs abundantly along ditches, streams, muddy trails, leaky garden faucets, etc. Some of its family associates are *Syntormon* and *Chrysotus* spp. *Dolichopus* restlessly explores pool margins, etc., and occasionally alights on a floating mass of algae. The larva is semi-aquatic and has been found in the muddy soil about a leaky faucet. *Syntormon distortitarsis* is likewise very common and apparently well distributed over

the Archipelago. The male has the habit which rather easily identifies the species, of poising a short distance in the air before the alighted female and finally of darting down at her. Both *Dolichopus* and *Syntormon* seem generally to inhabit rather open sunny places, and are thus not associated with many of the native species, as some of the often brilliantly colored flies of the endemic genus *Eurynogaster,* that patronize shady and even quite dark places along springs. The tiny dolichopodids of the genus *Chrysotus,* of which perhaps *C. pallidipalpus* Van Duzee is the most abundant on Oahu, frequent stream sides, wet rocks, and trails, low herbage, leaky faucet areas, and occur also in greenhouses. *Chrysotus* are of metallic coloration, and the males at least in some species, have greatly developed maxillary palpi which hang down like pale curtains from the head.

Finally, a single rather stout-bodied, rather spiniferous little dolichopodid larva was secured from between the moist leaf bases of the *ieie* vine, *Freycinetia arborea* Gaud; (Pandanaceae), at Palikea, Waianae Mountains, at an elevation of about 3000 feet.

Eurynogaster Van Duzee (Plates 17, 18 and 19)

Van Duzee, M. C., Proc. Haw'n Entom. Soc., VIII, pp. 339–340, Figs. 68–74, 1933.

The flies of this Hawaiian genus are usually upland or forest species. The ones that occur along streams, waterfalls, wet boulders bordering rapids, at springs and dripping wet banks are largely brilliant blue, green or coppery, while those frequenting the forest floor or trails and often the leaves of plants, are of duller hues. As far as known, the first of these two groups have aquatic or semi-aquatic larvae, and these will be considered here.

If we ascend the slopes of rugged Mt. Kaala, highest summit in the Waianae Range, Island of Oahu, the trail follows a narrow wooded ridge that at an altitude of about 3500 ft, and well within the cloud zone, passes over a wall of rock, cleft immediately to the right by a precipitous gully containing a small though perennial flow of cool clear water. This spring is well shaded by the giant roundish leaves of *apeʻapeʻ* (*Gunnera petaloidea* Gaud., Haloragidaceae) (Text fig. 3), *olona* (*Touchardia latifolia* Gaud., Urticaceae), *Cyrtandra* and other large-leaved plants. It extends back for some distance, where the lessening gradient permits muddy soil to accumulate along its small flows and pools and to form boggy areas. Much of this stretch is in the semi-gloom. Little rocky banks (Text fig. 4) exposed here and there to sunlight are bright with dripping or sheet-like water, saturated algae, liverworts, moss, brown diatoms, fine soil-like debris, etc.

Six species of *Eurynogaster* were found closely associated with this spring, as follows: *E. apicenigra* Parent; *E. obscurifacies* Parent—rarest and the least shining metallic—; *E. luteihalterata*

TEXT FIG. 3. *Apéapé* (*Gunnera petaloidea* Gaud., Haloragidaceae) growing in a boggy area at an elevation of about 3500 ft., in Mt. Kaala, Waianae Mts., Oahu.

Parent; *E. minor* (Parent)—the largest—; *E. nigrohalterata* Parent; and *E. viridifacies* Parent, the most abundant.

My observations on the ecology of these flies are very fragmentary, and I think that a more extended study on them would reveal that each species has a more or less special station or habitat, bearing on the amount of high light, gloom, relation to water flow, slope, materials, etc. *E. minor,* for example, appears to favor the steep banks with patchy high lights (water, etc., reflections), others seem to prefer obscurity, and *E. apicenigra* and *viridifacies* may also be seen in the sunlight on the large leaves of *Touchardia* that helps shade their watery environment.

TEXT FIG. 4. Dripping wet bank on Mt. Kaala, Oahu. The elevation is about 3500 ft. Portions of two Apeape leaves (the left withered) appear in the upper part of the picture; while at the far right are a few leaves of *Olona* (*Touchardia latifolia* Gaud.; Urticaceae). Six species of *Eurynogaster* are among the water-loving flies occurring along this spring.

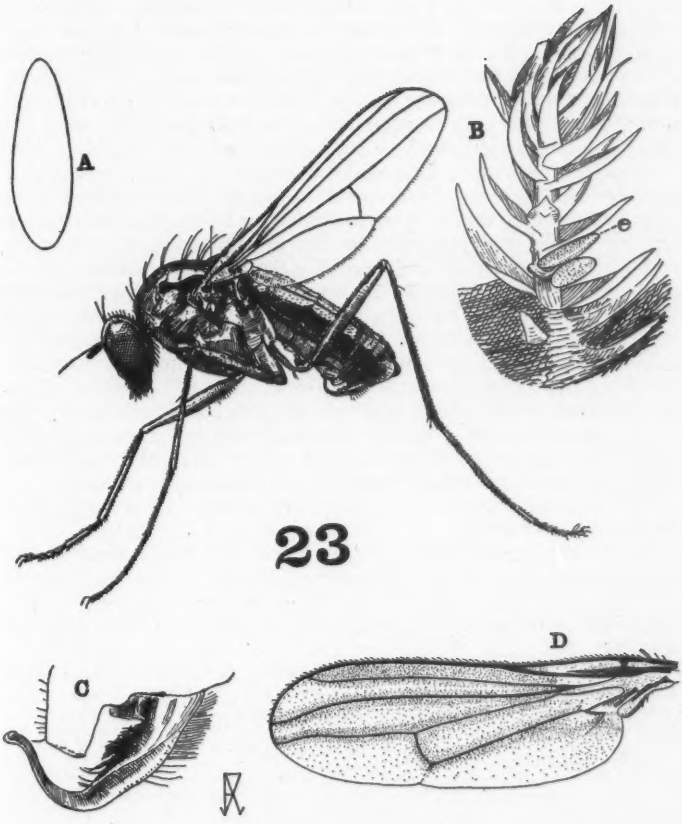
A little of the life-history of *E. minor* is known. This large species (fig. 23) is about 4 mm. long, metallic green with some blue and coppery, and iridescent wings. The arista of the antennae has a slightly club-shaped appearance due to the fine close-set ciliae at its distal end. Though brilliant, it is not conspicuous as it rests head upwards and high on its legs on a dripping-wet bank. The male may sometimes be seen courting the female—placing himself a half inch or so behind her and fluttering his wings at short intervals. A few females were observed laying eggs on fine plant growth on

a vertical bank sheeted over with water (Text fig. 4). The eggs were glued singly or a few side by side for their length; in one case on a tiny bit of moss just above the water line (fig. 23,A and B) and in another, among submerged green algae. They are slender, amber yellow and about 0.65–0.70 mm. long. Captive females likewise firmly glued their eggs on suitable materials. One individual may lay over 100 eggs, as determined by dissection. As far as could be determined, the incubation period appeared to be in the neighborhood of a week or a little more. The hatching *Eurynogaster* larva escapes from the egg shell by cutting a slit that extends from the apex of the narrower end to a little past the middle length where it is rather suddenly curved. The larva is then about twice the length of the egg and shows a well-silvered tracheal system in its semi-transparent body. Posteriorly, the four lobes that are provided with tufts of long bristles may be brought together for closure (fig. 28). Note that the spiracles are placed very close to the apex of each dorsal lobe (fig. 31). Lateroventrad on each side of the anal convexity is a hook-tipped pseudopod-like process, while slightly anterior to these in the mid-ventral region is a transverse row of hooks (fig. 29). This armament which disappears with moulting, may perhaps serve at times to anchor the larva against the current. A considerable number of *Eurynogaster* larvae were secured. Based on size—up to 13.5 mm. or more—and on further development, a good proportion of these were *E. minor*. On a steep, nearly bare wet rock bank alongside the spring a very slender and active *Eurynogaster* larva was found. Accumulations of fine brownish materials, mostly diatoms, or other fine plant life, on steep watered banks sometimes yielded *Eurynogaster* larvae, but these were more commonly obtained from the compact, flattened mop-like masses of fine roots of such plants as *Touchardia*, firmly pressed against the rocky substratum, and over or alongside which a sheet of water flowed, or that were merely water-soaked. Such well-shaded root-masses contained mud and silt, and when dissected out in a dish of water often proved rich in various water-loving larvae and pupae. Occasionally a less slender dolichopodid larva with shorter posterior lobes was found in the catch. Present also were early stages of *Scatella* flies (Ephydridae), those of *Lispocephala* (Anthomyiidae), as well as of *Tanytarsus* and *Spaniotoma?* (Chironomidae), these last two probably serving in large measure as food for the *Eurynogaster* and the other carnivorous fly larvae.

EURYNOGASTER MINOR AND HYDROPHORUS WILLIAMSI

Explanation of Plate 17

23. Male, from the side, Koolau Mts., Oahu. Inset at A, egg, greatly enlarged; at B. subaquatic moss, showing on one of the lower scales two eggs, the slender upper one is that of *E. minor*, the lower stouter one is probably that of an ephydrid fly; at C, aedeagus, from side, Mt. Kaala, Oahu; at D, wing of Hydrophorus williamsi, male; Molokai.


A
B
C
23
C
D

The larva of *E. minor* is whitish or pale yellowish, more slender than usual among the dolichopodid larvae with which I am familiar, and almost smooth, a slight fine roughness appearing in profile on some of the segments. Ventro-laterally on each thoracic segment is a tuft of four bristles (fig. 24,A). These are present in all the larval instars. Though hardly able to swim, it is very active, bending almost in a circle. They will devour one another in captivity. Well-grown specimens were placed in separate salve boxes or vials supplied with a bit of towel paper, fine rootlets and diatomaceous material, all well saturated with water. They were fed larvae of mosquitoes and of smaller midges. Such, more or less, is their natural food, as shown by an examination of gut contents of the specimens, the alimentary canal of one larva containing numerous portions of tracheal tubes and the head capsule and body portion of what seemed to be a *Spaniotoma.* Another *Eurynogaster* larva had swallowed a diatom and a quantity of hair-like material or bristles. Indifferent success attended my efforts at rearing these larvae. Several of the far-advanced individuals formed firm short-oval cocoons, gluing fine debris, etc., together. The interior was smoothly coated with a shining material. Such cocoons were much shorter than the contained larva which rested loop-like within. Soon the larva undergoes its final moult to become a pupa (figs. 25–27). It now measures about 4.3 mm. in length, or 6.5 mm. including the slender breathing tubes that protrude some distance out of the cocoon. The pupa is largely of a pale amber color, the breathing tubes brown except apically where they are blackish, and the dorsal spines on the abdomen, brown. No pupae hatched.

This fly occurs also in other parts of the Waianae Range and in the Koolau mountains.

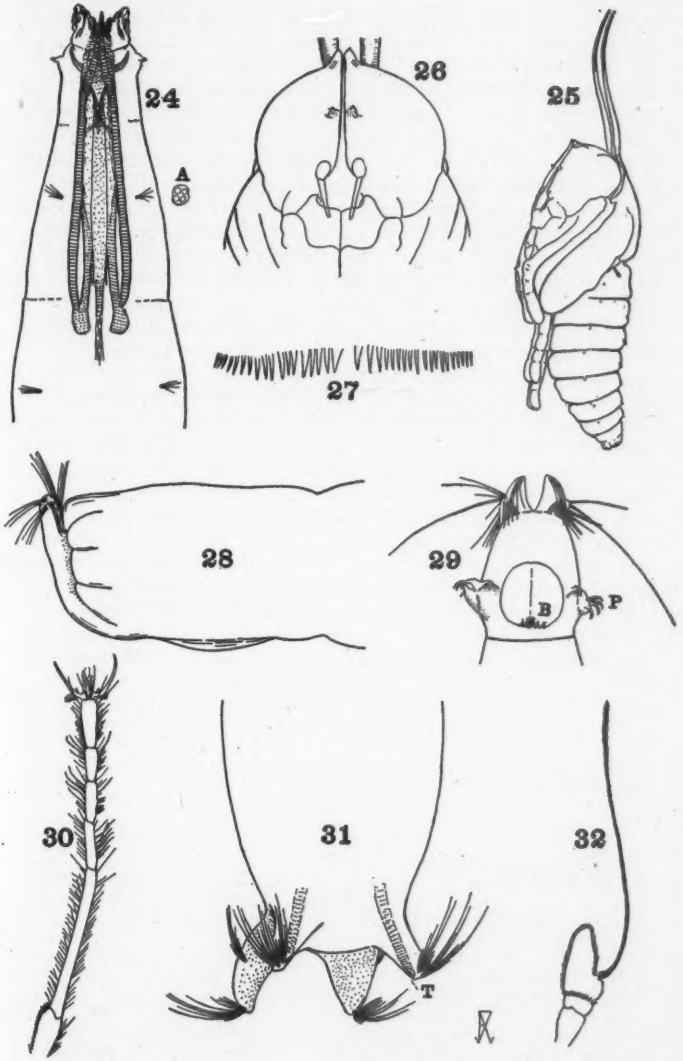
Eurynogaster viridifacies, rather small and brilliantly metallic, is at least in the male sex, a restless species. It has the habit of making short hovering flights in its up-grade exploration of dripping wet banks and, upon locating a female, of finally alighting near her.

A shining green species, slightly larger than *E. minor* is *E. bino-*

EURYNOGASTER MINOR

Explanation of Plate 18

24. Large larva, head end, from beneath to show two of the three hair tufts. At A, more enlarged is the base of one of these hair tufts.
25. Pupa. Length exclusive of respiratory processes, 4.3 mm.
26. Pupa, front view of head.
27. Pupa, row of dorsal spinules on 5th abdominal segment.
28. Larva, caudal end, side view to show terminal cup closed.
29. Larva, first stage, caudal end, from beneath to show latero-ventral proleg P, and mid-ventral spine band B.
30. Male, fore tarsus, dorsal view.
31. Large larva caudal end from above. At T, is one of the spiracles.
32. Male, antenna.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data Parent, thus far found only on the wet boulders of Kaluanui stream, Koolau Mts. (figs. 34–39). This region, one of the wettest on Oahu, lies at an elevation of about 2000 ft. Here and there among the fern, succulent plants and low, generally moss-grown and often none-too-healthy trees and shrubs is the sturdy fan palm *Pritchardia rockiana* Beccari, while the attractive white or pink-tinged, though nearly scentless flowers of *Phyllostegia,* a plant of the mint family help brighten the rather monotonous landscape. The perennial stream, in part bordered by the large native shrub-like *Hibiscus arnottianus* Gray, gives rise in a narrow cleft far below, to the famed Sacred Falls. *E. binodata,* a particularly wary species occupies much the same station as the native anthomyiid fly, *Lispocephala fusca* Malloch that occurs more rarely along this stream. Typically, it rests head upwards on the steep and even overhanging wetted and shaded face of a boulder and at a height there of a few inches above noisy or at least, rushing waters. It is usually difficult to catch, and so for its capture I often used a small jar rather than a large vial—as with many other dolichopodids—to place over it (Text fig. 5). Usually a single individual would be found here and there along the stream. Sometimes two were perched on the same boulder face, and if one of these were a male a courting scene might be witnessed. A male about two inches abreast of his prospective mate, gradually approached her in sidling advances of a few millimeters; then making a little curved flight alighted directly behind her. In this case the female soon took wing, but the male when situated just behind the female may rapidly move his wings—as we have recounted for *Eurynogaster minor.* It is on such wet boulders that these flies secure their prey. One was seen grasping a small nematocerous fly larva that suggested that of the green *Tanytarsus* midge. While no oviposition was ob-

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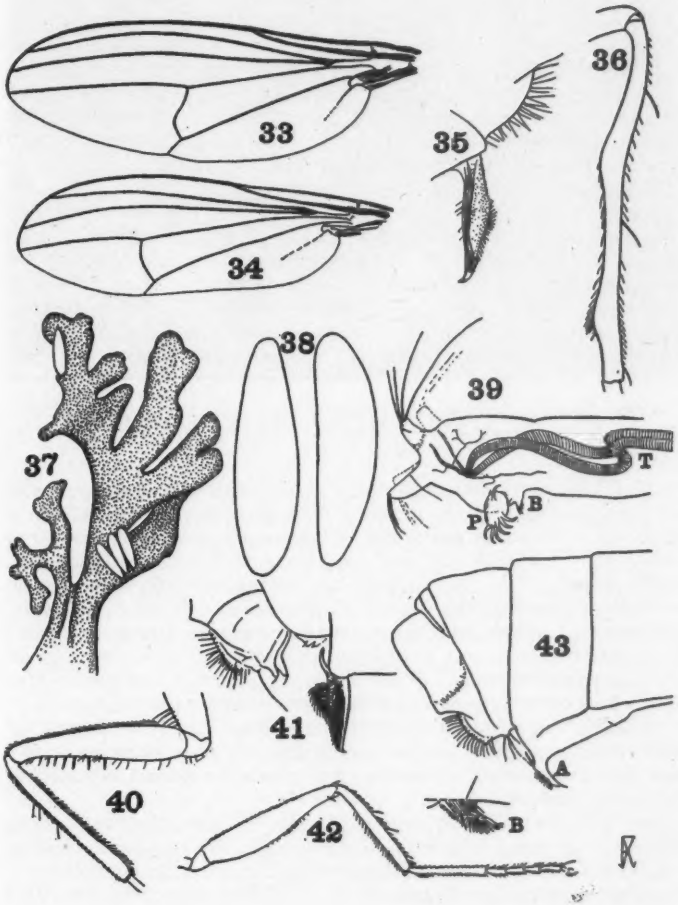
SIGMATINEURUM AND EURYNOGASTER

Explanation of Plate 19

33. *Sigmatineurum chalybeum,* wing; female. East Molokai.
34. *Eurynogaster binodata,* wing; male. Koolau Mts. Oahu.
35. " " male aedeagus. Side view.
36. " " " middle tibia.
37. " " Four eggs on a liverwort plant (Hepaticae) on wet rock in Kaluanui stream, Oahu.
38. *Eurynogaster binodata.* Eggs, more enlarged. Length 0.75 mm.
39. " " larva, first stage; caudal extremity in side view, to show hair fans, longitudinal tracheae (T), latero-ventral proleg (P) and mid-ventral spine band (B).
40. *Eurynogaster nigrohalterata,* male, fore femur and tarsus, from side. Mt. Kaala, Oahu.
41. *Eurynogaster nigrohalterata,* male, aedeagus, side view.
42. *Eurynogaster obscurifacies,* male, fore leg, from side, Mt. Kaala, Oahu.
43. *Eurynogaster viridifacies,* male, portion of abdomen from side to show aedeagus at A, Mt. Kaala, Oahu. At B, *Eurynogaster luteihalterata,* aedeagus, from side, Palikea, Oahu.


33
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B

TEXT FIG. 5. Catching *Eurynogaster binodata* along the Kaluanui Stream, Oahu, at about 2000 ft. elevation. Photo by Dr. Manson Valentine. April 1938.

served, eggs were found glued to small liverwort plants, probably of the genus *Marchantia* growing flatly on a wet boulder (figs. 37 and 38). They resembled those of *E. minor* and were about 0.75 mm. long. Likewise, the first stage larvae were very similar to the latter sp. (fig. 39). No further data were secured on this insect.

Along streams of the Islands of Molokai and Maui we find *Sigmatineurum chalybeum* Parent (1938) occupying situations similar to those of *E. binodata. Sigmatineurum* Parent, an endemic genus and so named because of the S-shaped posterior cross-vein (fig. 33). It is quite as large as *E. binodata* and appears to be rare.

Finally, there is *Paraliancalus metallicus* (Grims.), largest of our Dolichopodidae and also addicted to cascades, dripping banks, and boulders, along the mountain streams on the Islands of Molokai, Maui and Hawaii.

For the descriptive literature referring to *Eurynogaster viridifacies,* and *minor* (=*Paraliancalus minor*), *Paraliancalus metallicus* (Grims.) (=*Liancalus metallicus*) and *Sigmatineurum chalybeum,* see Parent, Abbé O., "Konowia," XVI, Heft 3, 4, pp. 209–219, 1937; and for the remaining water-loving *Eurynogaster,* and further discussion, refer to the same author in Proc. Haw'n Entom. Soc., X, No. 2, pp. 240–248, 1939. I am greatly indebted to Abbé Parent for his excellent treatise of many of our Hawaiian Dolichopodidae, a work that has taken much time and study in a very busy life.

Hydrophorus pacificus Van Duzee (Plate 20)

Van Duzee, M. C., Proc. Haw'n Entom. Soc., VIII, pp. 347–348, Pl. 24, Figs. 78 and 79, 1933.

A study of the insect fauna of our maritime marshes will soon bring to light this rather large, interesting, pale-colored dolichopodid fly (fig. 44). Long-legged and rangy, about 4.5 millimeters in length of body, in color a combination chiefly of light gray, metallic greenish, a tinge of purplish and stripes of that color on the back of the thorax, *Hydrophorus* is often seen bestraddling the waters of muddy shallows or exploring the oozy ground of their vicinity. Pairs of these insects, the male atop the female, will be noticed wandering about or, if disturbed, flying off a short distance. Quite at home on small unruffled sheets of water, the fly may walk or run over the surface, much as it would ashore, or this procedure will be aided by a momentary use of the wings; it is also capable of skating quite swiftly, and here, resting rather low on the water, its forefeet bent forward to the water, the hind ones trailing, *Hydrophorus* propels itself entirely by strong simultaneous strokes of its far-spreading middle legs. This last method, though effective, appears rather stiff and mechanical. And finally, it may proceed in skimming flight against a breeze.

It seems that this inhabitant of the sun-beaten lowlands requires occasional refreshment, for it will often stoop or teeter so as to bring the mouth down to moisture, while food may be wetted in the same manner. No doubt the fly eats many kinds of small organisms floating on the water, and it is very fond of "bloodworms" (the larva of the mosquito-like midge, *Chironomus hawaiiensis* Grims.). Observations made on *Hydrophorus* on May 3, 1931, in an abandoned rice field at Honouliuli, near Ewa, Oahu, are as follows: "In a locality where the mud was barely covered by water, and with here and there scant low herbs, this pale restless fly was not uncommon. A bright reddish object that the female of a pair was holding with her mouth was certainly a bloodworm *Chironomus hawaiiensis* Grims. The bloodworms, and the flies into which they develop, were abundant in and about these shallows. A wandering *Hydrophorus* fly seized with her tongue-like organ, or labella, a bloodworm that, despite its comparatively large size and vigorous struggles, was hoisted clear out of water and soon quieted. A little later, a second *Hydrophorus* stooped down and grasped a bloodworm, extricating it from the mud with a final heave. In one of these cases, the fly laid hold of the victim with a foreleg—in the laboratory both forelegs were frequently employed to hold small wounded flies placed in its prison. The grip that *Hydrophorus* secures on its prey with the forelegs is not very firm, the femora and tibiae being used while the tips of its legs protrude beyond the burden. The stout forelegs of both the male and female *Hydrophorus* are armed with strong spines, particularly at the apex of the tibiae beneath (fig. 44,A).

These flies live well in captivity, provided they have a good mucky environment with plenty of food. They will soon grow plump on a bloodworm diet, and tender wounded little flies are also acceptable. A captive female was observed eating a dead male of its own species and when disturbed flew off with it. Her labella was closely applied to the side of the thorax of her prey, of which she was evidently sucking the juices. This large morsel was held with the labella and fore tibiae.

On December 6, 1931, twenty *Hydrophorus* flies, some in pairs, were caught in a low brackish coral-bed marsh frequented by cattle, near Waialua, Oahu. They were confined in a glass culture dish about 9 inches in diameter and 2 inches deep partly filled with very wet mud from the flies' environment, and to which filamentous green algae, and ooze containing a quantity of bloodworms, were added. The *Hydrophorus* quickly made themselves at home in this muslin-screened receptacle of ill-smelling watery material, for almost immediately several of them had yanked a bloodworm out of the mud and water and were holding clear these squirming morsels by means of their labella and tweezer-like, with the middle portion of their forelegs. Five days later these flies were liberated; all were then in good condition, two were in a pair, and a number of purplish-black or dark brown eggs had been fastened in the wet algae along and above the water margin and on the muddy scum. These rather tough eggs (fig. 46) are smoky brown in transmitted light and very polished. One measured was 0.67 millimeter long. In the laboratory they are often pierced and sucked by the flies, so that it is advisable to remove the latter as soon as enough eggs have been laid.

In a few days—between 3 and 4 in one lot of eggs under observation—the active, glassy white maggots hatch, rupturing the eggshell

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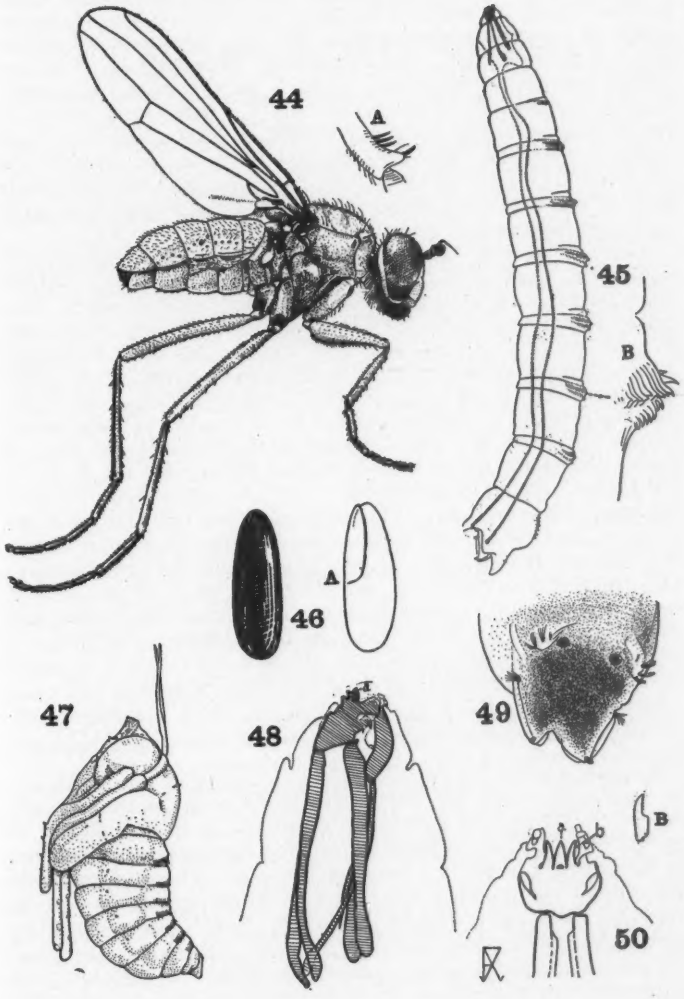
HYDROPHORUS PACIFICUS

Explanation of Plate 20

44. Adult fly, female. Length 4.5 mm. Note the narrow spiracle at angle of prothorax. A, extremity of fore tibia of male, highly magnified.
45. Full-grown larva, from the side. Length about 8.5 mm. The two black lines represent the tracheal or breathing tubes; their numerous branches having been omitted. B, spines on underside of segment 9, in profile; highly magnified.
46. Egg, A, the same hatched, showing characteristic emergence slit. Length about 0.67 mm.
47. Pupa, side view. Length to extremity of horns, 5 mm.
48. Head skeleton of full-grown larva, side view, to show the saw-like median tooth a, in profile; highly magnified.
49. Terminal breathing cup of full-grown larva, obliquely from above. The two spiracles show eye-like near the inner base of the dorsal valves. Highly magnified.
50. Head skeleton of full-grown larva; anterior portion, from above, to show the median tooth a, of Fig. 48; and the two lateral teeth b. B, lateral tooth, more highly magnified.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in a line that, commencing at or near the more conical extremity, extends to near the middle length, where it curves to one side (fig. 46,A). Under the microscope, the tiny *Hydrophorus* larva shows the contrasting blackish internal head skeleton (cephalopharyngeal skeleton) resembling somewhat parallel rods more or less fastened together anteriorly and extending freely backwards as far as the second segment of the thorax. Fine spines on paired transverse ventral swellings assist in locomotion. The respiratory system is represented by a pair of silvery tracheae, or breathing tubes that extend the length of the body and give forth smaller branches; at the fore end they terminate in prothoracic spiracles while posteriorly they connect with much larger spiracles situated in a sort of cup at the rather bulbous and truncate end of the body.

There are at least three larval stages, the cylindrical larva attaining a final length of 8.5 or more millimeters (fig. 45). Several large larvae were secured in their natural habitat, others were reared in the laboratory. Dwelling in muck they keep their cup-like tail end (fig. 49) in contact with the air; they move backwards as readily as forwards and, when disturbed, retreat below, partly closing the cup by drawing its valves closer together and enclosing, with the help of the slightly incurved finger-like tips of these valves, a small bubble of air. At least when small, the larvae can suspend themselves by the tail end to the surface film of water. They did not appear capable of swimming. They are active and, like their parents, quite voracious. The sometimes red color of their alimentary tract showed that they ate the bloodworms in their dishes; they likewise fed upon the larvae of small moth-fly (Psychodidae) and probably also that of a tipulid fly, that occurred naturally in their environment. Cannibalism seems to exist here, and dead *Hydrophorus* larvae were found in the laboratory material. A part-grown individual successfully attacked the larva of a tipulid fly much bigger than itself; it clung to its squirming prey and made a large hole near the posterior end so that fluid issued from the wound. A mosquito wriggler placed in contact with a hydrophorid was also pierced and eaten of.

In the full-fed larva (fig. 45), the fore part of the head skeleton, as seen from above, (fig. 50) shows three strong teeth; a simple curved one, B, on each side and a stouter one, a, in the middle. A profile view of the head skeleton (fig. 48) shows that this unpaired median tooth, a, is really a three-toothed saw. These are evidently the cutting mouthparts. On each side of the ventral line of the fore part of segments 4 to 10 inclusive is a low transverse swelling or "pseudopod." These swellings have, as outgrowths, two series of fine, backward-pointing spines (fig. 45,B, 9th segment), the anterior series close-set in one transverse row, the second series, posterior to the first but adjoining it, consisting of somewhat curved spines arranged in oblique parallel rows. The spine development

is somewhat rudimentary on segment 4, while on the 11th or terminal segment there are two nearly ventral patches of spines and some spines about the rectal opening situated on the underside of this segment.

The *Hydrophorus* larva has a pair of small apparently functional spiracles on the prothorax, and another much larger caudal pair situated near the inner base of the dorsal wedge-shaped cup-valves, there being two larger ventral protuberances with a very small one between each and the dorsal valves. Fig. 49 shows the breathing cup obliquely from above; note the little whisker-like tufts of hair on the margin of the flanged lobes or valves. The interior of the breathing cup is kept dry.

Several larvae that appeared to be full fed were kept separately in a little mud in small tins. From these I secured three cocoons—oblong, mud-covered outside but glossed smooth inside, not overstrong, flexible and capable, even when broken up, of withstanding prolonged soaking without dissolution of the thin inner membrane-like sac. I kept them very moist and finally dissected out two of them thus exposing the horned mobile pupa (fig. 47) and the shrivelled larval exuvium. The pupa is about 5 mm. long to the tip of horns. It is in part a sort of pale brownish. On the face are a pair of rather short dark ridges and a large median one on the top of the head. The delicate horns are, of course, breathing tubes that connect with the large spiracle on each side of the thorax of the developing adult. A row of stiff hairs are present on the back of most of the abdominal segments. The pupa works itself, wholly or in part, out of the cocoon to disclose the adult fly. The pupal stage lasts but a few days.

My records of the life history of this fly are scant. *Hydrophorus* larvae were not isolated until near pupation and were placed in mud secured in the field that may have already contained larvae. Three records, however, give 29, 33, and 41 days as the intervals from the placing of adult flies in prepared jars, to the appearance of a new brood of adults.

Hydrophorus pacificus is also found in rain pools at quite a distance from the sea, but is more abundant in marshes near the coast and occurs even at salty puddles along beaches. Likewise, it may be seen in standing water in irrigation lines of lowland fields of sugar cane that are not far removed from seaside marshes—as at Kahuku, Oahu. In September 1935, it was observed in very large numbers at Kailua, Oahu where a remaining thread of water margined with slimy green algae ran through the low water-soaked ground.

It is an insect apparently peculiar to the Hawaiian Islands. Records show adults, presumably all of this species, seen or taken in the following localities: Waimea, Kauai, April 30, 1905 (Shore), F. W. Terry; Kekaha, Kauai, November 17, 1931 (trench water near

shore), F. X. Williams; Honolulu, O. H. Swezey; Honouliuli (mud flats), Ewa Plantation Company, January 26, 1931 (on water weeds at edge of reservoirs); Waialua (mud flats); Kailua, August 19, 1931 (shallow rain puddles in cane field road); Kahuku, summer 1933 (cane field); Pineapple Experiment Station, Honolulu (rain puddle), Oahu, F. X. Williams. It has also been observed abundantly, running over salty or brackish water at Mokapu Point, and elsewhere on Oahu, by Mr. E. H. Bryan, Jr. Another and far removed locality is Laysan Island, April 8 and 13, 1923 (D. T. Fullaway).

The larva, pupa and cocoon of the related *Hydrophorus agalma* Wheeler, are excellently figured and described by C. T. Greene, (Proc. Entom. Soc. Wash. 25, pp. 66–69, 1923, 1 plate). His material was secured from Lake Winnipeg, Canada. Here is repeated in part, Greene's quotation of Prof. O'Donoghue, who secured the specimens, as follows: "The specimens were taken in water only a few inches deep. . . . The bottom here is a mixture mainly composed of sand." The larva and pupa appear scarcely to differ from those of the Hawaiian species. "The long anterior spiracle of the pupa projects through the sand cocoon about the length of one joint." In one case the pupal spiracles of the Hawaiian *Hydrophorus* were partly extruded from the cocoon when the fly was nearly ready to issue but a poke made the pupa back entirely out of sight.

Hydrophorus williamsi Parent

Hydrophorus williamsi, Parent, O., Konowia, XVI, pp. 211–212, figs. 22 and 23, 1938.

This species may be distinguished from *H. pacificus* chiefly by the infuscation along the wing veins (Pl. 17, fig. 23,D), by the weaker bristling of the fore femora and by its smaller size.

The type was described from specimens taken October 20, 1933, in a maritime marsh at Honuapu, Kau district, Hawaii. This area of apparently brackish water resting on a bed of black lava seemed not directly connected with the adjoining sea. It contained fish, crabs and shrimp-like crustaceans. Along its muddy bottom, the bug *Trichocorixa blackburni* (White), could be seen, at or near

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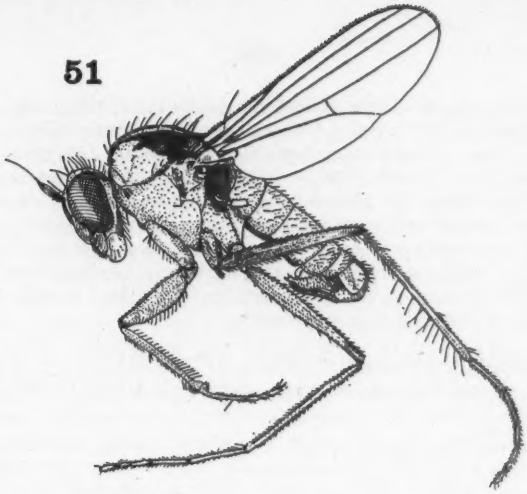
CYMATOPUS ACROSTICALIS

Explanation of Plate 21

51. Adult, male. Length about 3.20 mm. East Molokai, seashore.
52. Larva.
53. Larva; portion of spinous area of third abdominal proleg.
54. Egg. Length 0.50 mm, diameter 0.25 mm.
55. Adult, male, to show modification of fore tibia and tarsus.
56. Larva; caudal extremity of body, posterior view, to show processes, hair fans and spiracles.
57. Pupa, from the side. Length of body about 3.30 mm.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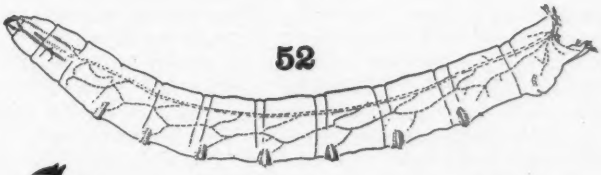
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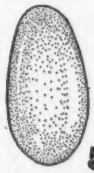
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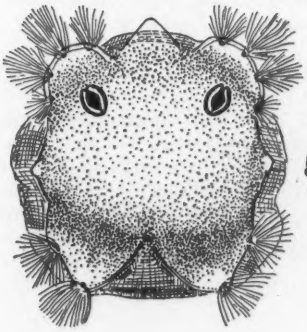
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the shore was the little *Microvelia vagans* (White) bug, and the flies, *Brachydeutera hebes* Cress., *Scatella sexnotata* Cress. (Ephydridae), the common dolichopodid *Syntormon distortitarsis* V.D. and one of the Psychodidae. It seems less of a water skater than its larger relative but addicted to more saline waters. Near Honolulu it may be common on tidal mud flats and at Mapulehu, Molokai was not uncommon at or near the edge of a mullet pond narrowly connected with the sea. Like *H. pacificus* it is often seen in pairs. It is quite voracious, attacking weaker flies when confined with it. Nothing is known of its early stages.

Cymatopus acrosticalis Parent. (Plate 21)

Parent, O., Konowia, XVI, pp. 69–71, Figs. 4 and 5, 1938 (male and female).

Hanauma Bay lies a few miles east of Honolulu and is formed by a tuff crater that is widely open to the sea. There is a rather extensive sandy beach at its head, but elsewhere the shore is rugged and rocky. A reef protects a considerable part of the shore from the full force of the waves. Because of its accessibility and the relative abundance of seashore insects, Hanauma Bay has contributed most of the data on these forms of life. While the sandy beach above the tidal mark is the chief habitat of the elusive little *Chersodromia hawaiiensis* Melander (Empididae) and of one or two other flies, the sea rocks just above and within the tidal zone furnish the more truly water-loving forms and the one that concerns us here.

Everywhere on rocks exposed by the tide and even on the coarse sand towards the sea we may observe *Cymatopus acrosticalis* (fig. 51, male), a chiefly grayish dolichopodid fly somewhat over 3 millimeters long. The place is alive with them. They move in rapid jerky progress, now flying over a short space, and now, when one disturbs another, jumping well up in air; or dozens upon dozens of them may wander briskly over the limp foliaceous green *Ulva* and other algae. They do not seem to prey upon the quiet though alert *Canace* flies but are intent upon picking up the slender orange-red larvae, and probably also the pupae of *Dasyhelea calvescens* Macfie (Ceratopogonidae) occurring near the upper tidal limits, or beyond.[1] Available well within the tidal zone are other midges—one or more species of *Clunio,* and *Telmatogeton pusillum* Edw.,—of the family Chironomidae. On one occasion *Cymatopus* was observed with a young larva of its own species in its mouth, while on another, with that of *Canace nudata* Cresson.

Cymatopus confined in a vial and fed with *Chironomus* larvae laid a few oval, fairly polished brownish eggs (fig. 54) that measured about 0.50×0.25 mm. Within a week or a little more, four glassy white larvae hatched, issuing from an oblique cut at the narrower end of the eggs. The bristles on the lobes at the tail end of

[1] Notes of May 19, 1936, 8 : 30 A.M., at quite low tide.

the body are well developed, and efficient thorn-armed swellings or prolegs ventrad on the body are already present. Larvae were not reared to pupation but well-grown individuals were found in a very shallow detached splash pool lined with felt-like algal mud, in the upper tidal zone of rock with tiny pockets of mud and algae, and more rarely within the zone of green algae. The larvae (figs. 52, 53 and 56) are carnivorous like the adults and their often yellowish orange coloration suggests that their prey is commonly immature stages of *Dasyhelea calvescens*. Pupal shells exposed by low tide, or in splash pools and sometimes protruding from a cell or cocoon may be found. The pupa (fig. 57) is more or less glassy orange yellow, with the spines on the abdominal segments above reddish brown. There is a sharp cocoon breaker on the head while the respiratory processes are strap-like and rounded apically.

Cymatopus acrosticalis described from the Island of Molokai, also occcurs plentifully on the shores of Oahu and Maui. Further collecting will probably show that it occurs widely over the Archipelago. In 1923, it was collected on the Tanager Expedition, chiefly by E. H. Bryan, Jr., on Wake Atoll, more than 2000 miles west of Honolulu, and on Nihoa, Necker, French Frigate Shoals and Lisiansky, atolls and rocks extending WNW from the main Hawaiian group. (Insects of Hawaii, Johnston Island and Wake Island; Bryan, E. H., Jr., and Collaborators; B. P. Bishop Museum, Bull. 31, Tanager Expedition, Publ. No. 3, pp. 1–94, 1926.) Abbé O. Parent (1938) gives a key differentiating the eight species of the genus *Cymatopus* described from the Pacific littoral. He is of opinion (p. 71) that this genus occupies the same place in the Pacific that the genus *Aphrosylus* does on the Atlantic shores.

Dr. L. G. Saunders in his excellent account of "Some Marine Insects of the Pacific Coast of Canada" (Ann. Entom. Soc. America, XXI, pp. 521–545, 9 figs., 1928) describes and figures some of the early stages of *Aphrosylus*[2] *praedator* Wheeler (1897). This insect both in biology and in structure bears considerable resemblance to our *Cymatopus acrosticalis*.

[2] Referred to the subgenus *Paraphrosylus* by Dr. T. Becker (1921).

The Rediscovery of Mauia in Hawaii (Coleoptera: Anthribidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of January 5, 1938)

The genus *Mauia* was erected by Reverend Blackburn in 1885 (Roy. Dublin Soc., Sci. Trans., vol. 3, p. 194) for a single specimen of an anthribid beaten from the "branches of trees near Wailuku, Maui, not very much above sea-level." This species, which Blackburn called *Mauia satelles,* was not collected by Perkins nor known to him by other specimens at the time of the writing of "Fauna Hawaiiensis." It has not been recorded in Hawaii since its description.

In recent years it has been shown that *Araecerus subnotatus* Boheman 1859 belonged not to *Araecerus* but to *Mauia* and was conspecific with Blackburn's *M. satelles.* Blackburn's genotype is, therefore, now known by the name *Mauia subnotatus* (Boheman). The genotype of the monotypic genus *Contexta* Jordan 1902 has also proved a synonym of *Mauia subnotatus.*

Recently, while studying the Anthribidae in the collection of the Hawaiian Sugar Planters' collection, I found four specimens which belong to this species. Because this insect has not been recorded in Hawaii for more than 50 years, it is of interest and value to place these new data on record. The first of these specimens was collected in the Museum at Honolulu, Novemer 16, 1917, by Mr. Swezey. Two other specimens were collected by Mr. Swezey from dead coconut fronds—the first at Kaneohe, Oahu, February 11, 1923, the second at Lihue, Kauai, August 22, 1925. The fourth specimen in the series was collected from a bamboo fence at Grove Farm, Kauai, by Dr. Williams in November 1931. I have seen one specimen from Hawaii, and I collected one specimen in Makiki, Honolulu, August 31, 1936. This information shows that the species is found on four of our islands but is rare. It probably inhabits all of the main Hawaiian islands. The species is widely distributed from the Marquesas Islands in eastern Oceania through the tropics of the Old World.

Proc. Haw. Ent. Soc., X, No. 2, December, 1939.

The Genus Apion in Fiji (Coleoptera, Curculionidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of February 3, 1938)

The genus *Apion* is probably the largest and most widely distributed genus of the Rhyncophora. It contains about 1500 species found in both hemispheres of the old and new worlds from arctic regions to tropical jungles. Few species have been described from Oceania. Heretofore, the eastern limit of the genus in the Pacific has been New Caledonia, whence one species has been described, and none have been recorded from Fiji. A few species have been described from scattered localities between New Caledonia and the Malay Peninsula, and these show that the distribution of the genus is continuous from the Oriental region eastward into Oceania. There are undoubtedly large numbers of species to be found in the Indo-Australian regions when more thorough collecting is done. It is probable that Fiji marks the eastern limit of the genus in Oceania and that few species will be found there.

The holotype of the following new species was sent to me for study from Lea's collection in the South Australian Museum through cooperation of its Director, Dr. Herbert M. Hale. After this paper was written, I had the good fortune to do some research in Fiji, and while there I found a series of the species and a revision of the manuscript to include a description of the female, and notes on the host and distribution of species are now included.

Apion vitiensis, new species (fig. 1).

Male.—Derm slightly glistening, reddish brown above; rostrum yellowish near the apex; antennae brownish yellow; legs yellow, with the trochanters darker and the coxae reddish brown; sternum and venter reddish brown, somewhat darker than the elytra; pubescence coarse, white or yellow, prostrate; elytra with a variable, semi-denuded, more or less W-shaped mark at about the middle, extending laterally over the first four intervals and thence extended irregularly and less definitely toward the humeri.

Head reticulate, not very obviously punctate; pubescence anteriorly inclined, condensed around the margins of the eyes, that on the under side consisting of larger, broader, flattened, more or less medianly inclined setae; the dorsal outline strongly interrupted just behind the eyes by a distinct constriction, the space behind the constriction not pubescent, the interocular area very slightly longitudinally convex; eyes large, about one third broader than the interocular area, almost circular, but one tenth longer than broad, twice as long as the distance between the eye and the prothorax or as long as the first two antennal segments. *Rostrum* two and one half times as long as the eye in the male, slightly swollen over the antennae then straightly and slightly narrowing to the apex; sculpture similar to that on the head; the median line and apical third not pubescent. *Antennae* slightly longer than the rostrum, the scape almost capable of reaching the eye and as long as funicular segments one plus two, one as broad as the scape and about as long as two plus half of three, two somewhat longer than three, three to five subequal, six and seven slightly longer; club elongate-oval, somewhat more than one third as broad as long, sharply pointed, somewhat

longer than the preceding four segments, the first segment making up one third of its mass. *Prothorax* as high and as broad as long, base sinuous, slightly arcuate on the sides to beyond the middle and there shallowly constricted, apex slightly convex, almost truncate, the longitudinal dorsal outline almost evenly convex; derm reticulate; the setae arising from closely placed punctures, directed anteriorly, rather evenly distributed, not concealing the derm. *Scutellum* bare. *Elytra* two thirds as broad as long, two thirds longer than the prothorax; base hardly sinuous, the sides almost evenly arcuate from the base to near the apex, each elytron separately rounded at the apex; sculpture similar to that on the pronotum; striae narrow and well impressed, without distinct punctures; intervals slightly convex; pubescence similar to that on the pronotum or slightly denser, directed posteriorly, somewhat condensed on the base of interval two. *Legs* with hairlike pubescence, that on the lower surface of the fore femora longer and erect; femora moderately strongly clavate, edentate; tibiae slender, the fore pair simple, the mid and hind pair armed at the inner apical angle with a strongly developed uncus; first tarsal segment somewhat longer than the second, second as long or but slightly longer than the third

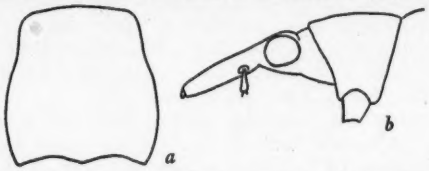

FIG. 1. *Apion vitiensis,* new species: *a,* outline of the pronotum; *b,* outline of prothorax, head, and rostrum.

which is deeply bilobed, the lobes narrow; each claw armed with a prominent basal tooth. *Sternum* with the fore coxae contiguous, two tenths higher than long, more prominent than the mexocoxae which are separated by a distance about equal to the breadth of a tibia; metasternum rather shallowly punctate, the pubescence denser toward the sides, condensed on the metepisternum and the mesopleural sclerites. *Venter* rather densely pubescent, finely and shallowly punctate.

The female differs from the male as follows: rostrum five times as long as an eye, twice as long as the prothorax, with a few setae at the base only; antennae with the scape reaching to slightly more than two thirds the distance to the eye, inserted at slightly less than one and one half times the length of an eye from the eyes, as long as funicular segments one to three inclusive, one as long as two plus three; fore femora without longer hair below, none of the tibiae uncinate; Length (male and female, head and rostrum excluded): 2.0–2.5 mm.; breadth: 0.9–1.2 mm.

Fiji: Viti Levu. Holotype male, collected by A. M. Lea (1924?), in the South Australian Museum at Adelaide, allotype female and 25 paratypes, in Bishop Museum, beaten by me from dead fern fronds on the belt road, 16 miles west of Suva, July 22, 1938, elevation 250 feet. The specimens collected by me were taken from at least two large species of ferns.

The reddish derm with the conspicuous yellow or whitish pubescence makes this an easily recognized species. It is not possible for me to place this species as a definite ally of a known species, because of our poor knowledge of the Oceanic *Apion,* but it is rather closely allied to some undetermined eastern Australian species in the collection before me.

A Review of the Hawaiian Mycetophagidae (Coleoptera)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of March 3, 1938)

There are four species of Mycetophagidae (hairy fungus beetles) found in Hawaii. All of these are adventitious, and Hawaii is, therefore, without an endemic mycetophagid fauna. Of our four species, one is cosmopolitan, one is widespread in North America and the other two are found in Samoa also.

The Mycetophagidae are world-wide in distribution; about 200 species have been described. They are best represented in the Old World; six genera containing 32 species are found in America north of Mexico, and very few have been found in the Neotropical region. Two genera representing 12 species are listed in New Zealand, and five genera containing nine species have been recorded from Oceania east of Papua, excluding Hawaii and New Zealand. The only species thus far found in Samoa are two that were for many years known only from Hawaii. None have been described from Fiji.

The beetles and their larvae frequent dead or dying vegetation where fungi are obtainable. They may be found beneath bark or in dead twigs. The larvae are slender, subparallel-sided, with rather conspicuous four-segmented antennae, sparse long hairs at the sides of the body, and the terminal abdominal segment bears two prominent, sclerotized, dorsal protuberances.

KEY TO THE HAWAIIAN GENERA

1. Fore coxae separated by a distance about equal to twice the breadth of a coxa ..... **Propalticus**
   Fore coxae narrowly separated, the intercoxal process obviously narrower than a coxa 2
2. Clypeal suture distinctly impressed; inflexed edges of the elytra oblique, visible from the sides, their inner edges at a lower plane than the lateral margin of the elytra; elytra not maculate; side margins of the prothorax not greatly produced ..... **Typhea**
   Clypeal suture obsolete or nearly so; inflexed edge of the elytra invisible from the sides, hidden by the lateral edges of the elytra which are produced downward to a plane below that of the inner edge of the inflexed part which is concave and dorso medianly inclined; elytra maculate; sides of the prothorax produced into thin flanges similar to and subcontinuous with the sides of the elytra ..... **Litargus**

Genus **Propalticus** Sharp, 1879

This is an anomalous genus provisionally placed in the Mycetophagidae. It does not fit into the general structural scheme of the Mycetophagidae, but has been included in the family by Dr. Sharp and Dr. Hugh Scott because no better place could be found by them for it. It is quite possible, I believe, that a new family should be erected to receive it.

Propalticus was erected by Dr. Sharp (Trans. Ent. Soc. London, p. 88, 1879) for the reception of our Hawaiian species, which is, therefore, the genotype. In 1882, Dr. Sharp described a second species, *Propalticus jansoni,* from New Guinea. In 1922 (Trans. Linn. Soc., Zool. (2), vol. 18, pp. 253–257) Dr. Scott gave an excellent review of the genus and described a third species, *P. sechellarum,* from the Seychelles. Dr. Scott also tells of having seen undescribed species of the genus from "Madagascar, Sumatra and the Nias Islands, Japan, Sierra Leone and San Thomé." He has also seen some undescribed species of what may be a closely related genus from the Cameroons and the Belgian Congo. He has thus shown that the genus has a wide distribution from West Africa to Hawaii.

In several keys and family synopses which I have used, I have been unable to place this genus in the family Mycetophagidae, but it does seem to approach the Cryptophagidae. Unfortunately, I am unqualified to properly revise the genus or to place it more accurately and will follow Dr. Scott for the present.

1. Propalticus oculatus Sharp (fig. 1,*d*).

Sharp, D.: Trans. Ent. Soc. London, p. 88, 1879; Cistula Ent., vol. 3, p. 31, pl. II, fig. 1, 1882.

Scott, H.: Fauna Hawaiiensis, vol. 3, p. 420, pl. xvi, figs. 12–14, 1908; Trans. Linn. Soc. London, vol. 18, p. 253, fig. 7a, 1922.

This species can be easily recognized by its robust form, peculiar antennae, widely separated coxae, five segmented tarsi and by the peculiar apical spur on the fore tibia.

Dr. Scott described the antennae as 14 or 15 segmented in "Fauna Hawaiiensis," but in 1922 corrected his statement and showed that the antennae are really only 11 segmented. The peculiarly formed antennal club is most misleading and appears to be formed of five or six segments.

This species has also been found in Samoa. It is an active jumper and is probably found on all of our main islands. I have seen specimens collected at all seasons of the year from bark of dying and dead avocado and dead *Xylosma.*

Genus **Typhea** Curtis, 1830

The characters given in the key will enable one to recognize this genus among the Hawaiian Mycetophagidae. There are nine species in the genus and these are found in widely separated localities about the world.

2. Typhea sterocorea (Linnaeus) (fig. 1,*c*).

Dermestes stercorea Linnaeus: Syst. Nat. 10th ed. p. 357, 1758.
Dermestes fumata Linnaeus: Syst. Nat. 12th ed. p. 654, 1766.

This species is the largest of our mycetophagids and can easily be recognized by its subparallel-sided form and concolorous body. It

has been spread by commerce and is now cosmopolitian. It was found by Blackburn before 1885 in Honolulu and can be expected to be found generally distributed throughout the lowlands of our islands and may be found on dead vegetation or perhaps about grain or grain products.

Genus **Litargus** Erichson, 1832

The two members of this genus found in our islands can be generically recognized by the flange-like sides of the elytra and prothorax and by their conspicuously maculate elytra. The genus is cosmopolitan in distribution and contains over 60 species.

KEY TO THE HAWAIIAN SPECIES OF LITARGUS

Terminal segment of the antennal club approximately as long as the two preceding segments together; elytra not strongly attenuated caudad ..... **L. balteatus**

Terminal segment of the antennal club obviously shorter than the two preceding segments together; elytra rather conspicuously tapered from base to apex ..... **L. vestitus**

3. **Litargus balteatus** Le Conte

Le Conte, J.: Proc. Philadelphia Acad. Nat. Sci., vol. 8, p. 14, 1856.

This species is widespread in North America and evidently ranges southward into Central America. It belongs to Casey's subgenus *Alitargus* because its terminal antennal segment is elongate and obliquely truncate. Some of our specimens probably belong to the variety *transversus* Le Conte, but, because of variation, I believe it best that we refer our specimens to *L. balteatus* until it can be shown that two different types occur here and that they can be separated.

The long terminal antennal segment together with its more robust shape readily distinguishes this species from *Litargus vestitus*.

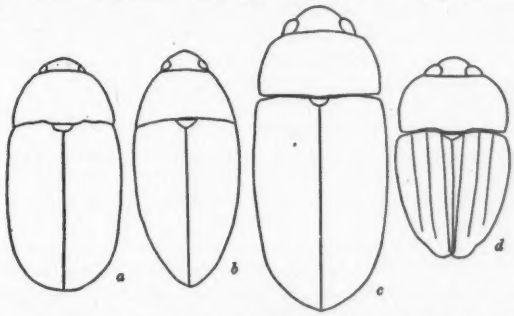

FIG. 1. Outlines of Hawaiian Mycetophagidae: *a, Litargus balteatus* Le Conte; *b, Litargus vestitus* Sharp; *c, Typhea stercorea* (Linneaus); *d, Propalticus oculatus* Sharp.

This species is generally distributed throughout the islands. It occasionally comes to light and has been found in dead sugar cane and cane leaves and in dead *Sapindus.*

4. Litargus vestitus Sharp

Sharp, D.: Trans. Ent. Soc. London, p. 88, 1879.

This species was found in Hawaii before 1885 by Blackburn and has also been found in Samoa. It is quite probable, I believe, that it will be found to have a widespread distribution in Oceania. In our islands it ranges from sea level to over 5000 feet, and has been collected from dead guava, *Acacia confusa,* pods of *Acacia farnesiana* and from *Acacia koa.*

Blepiarda of Fiji (Coleoptera: Curculionidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of April 7, 1938)

Blepiarda is a cryptorhynchine genus of weevils which was erected by Pascoe in 1865 for the reception of the eastern Australian *Blepiarda undulata,* the genotype, and *B. lophotes* from Fiji. Subsequently, nine other species have been described from the Indo-Malayan, Austro-Malayan, and Australian regions. I believe the genus probably had its origin in Papua. From there it spread westward into the Philippines, southward along the moist, forested east coast of Australia through Queensland, New South Wales, into Victoria, and made its way eastward through the islands to Fiji. Only one species has been recorded from the great area and numerous islands lying between Papua and Fiji, but further collecting will undoubtedly reveal many species in that region.

Genus **Blepiarda** Pascoe

Blepiarda Pascoe: Jour. Ent., vol. 2, p. 430, 1865.
Trichogonus Fairmaire: Petites Nouv. Ent., vol. 2, p. 282, 1878; Ann. Ent. Soc. France, p. 310, 1881. *New synonym.*

I have compared the genotype of *Trichogonus* (*T. unipenicillus* Fairmaire) with the genotype of *Blepiarda* and can find no major structural features to generically separate the two species. When Fairmaire described *Trichogonus* he had the Fijian *Blepiarda lophotes* Pascoe at hand. There are greater differences between *Trichogonus unipenicillus* and *Blepiarda lophotes* than there are between *T. unipenicillus* and the genotype of *Blepiarda.* I believe that the characters which most greatly influenced Fairmaire in separating *Trichogonus* from *Blepiarda* were the length of the second funicular segment and the structure of the lateral margin of the elytra. On the male of *Trichogonus unipenicillus* the second funicular segment is two thirds longer than the first, whereas the first and second segments are subequal in length on the male of *Blepiarda lophotes;* but the male of *Blepiarda undulata* has the second segment one third longer than the first. On the female of *Trichogonus unipenicillus* the second funicular segment is only one fifth longer than the first; on *Blepiarda lophotes* the same is true or it is somewhat more elongate. It seems to me, therefore, that the length of the second funicular segment is subject to interspecific variability and is not a character of generic rank.

On *Blepiarda lophotes* the outside interval on the elytra is expanded over the metepisternum so that that sclerite appears distinctly narrowed midway between the mid and hind coxae. On

Trichogonus unipenicillus, however, the outside interval of the elytra is not expanded and the metepisternum appears subparallel-sided for most of its length, and this is also exactly the structure found in *Blepiarda undulata.* When additional species are examined, it will probably be shown that this character is subject to variation between species.

For these reasons I believe that *Trichogonus* Fairmaire should be merged with *Blepiarda* Pascoe.

Blepiarda bacillifera (Heller), new combination.

Trichogonus bacillifer Heller: Naturforschende Gesellschaft, Basel Verhandlungen, vol. 45, p. 27, fig., 1934.

Although I have not seen this Solomon Islands insect, Heller's description and figure show that the species also belongs to *Blepiarda.*

KEY TO THE FIJIAN SPECIES OF BLEPIARDA

Metepisternum subparallel-sided, fully half as broad at the middle as the length of its oblique apex; second funicular segment of the male two thirds longer than the first; fresh specimens uniformly clothed above with cinnamon-buff scales with the scutellum white
B. unipenicilla (Fairmaire)

Metepisternum conspicuously narrowed at the middle and there not more than one fourth as broad as the length of its oblique apex, distinctly narrowed at the middle by the conspicuous down lobing of the outer elytral interval; scaling predominantly brown interspersed with white scales
B. lophotes Pascoe

1. Blepiarda unipenicilla (Fairmaire), new combination.

Trichogonus unipenicillus Fairmaire: Petites Nouv. Ent., p. 282, 1878; Ann. Soc. Ent. France, p. 310, 1881.

Derm black, antennae and tarsi reddish brown; very densely clothed above with cinnamon-buff scales except for the scutellum which forms an outstanding white patch.

Head with a strong interocular fovea and a deep median sulcus that is not conspicuously interrupted in the middle; scaling concolorous. *Rostrum* in the male swollen beyond the base, densely squamose and punctate from base to the insertion of the antennae, and with a short median carina above the antennae; narrowed in female from base to antennae, coarsely punctate and squamose only in basal third, thence smooth, shiny, and subcylindrical. *Antennae* in male inserted just behind mandibles, scape reaching middle of eye but not hind margin; second funicular segment almost twice the length of the first, longer than club and about twice as long as segments three to seven inclusive, which are transverse and moniliform; club cylindrical, slightly shorter than second funicular segment, finely pubescent; first funicular segment without conspicuous setae, two with long, fine, scattered hairs beneath, three to seven each with a whorl of similar hairs that are longer on the inside; club without long hairs; as follows in the female; inserted at middle, scape not reaching middle of eye, second funicular segment about one fifth longer than first and two fifths longer than segments three to seven inclusive, which are transverse and subequal; club distinctly longer than preceding six segments which have whorls of stiff setae but are not hirsute. *Prothorax* concave in longitudinal dorsal outline, apex higher

than sinuate base, subtriangular, about twice as broad as long; with a short, rather inconspicuous median callus; scaling imbricated, concealing the uneven, densely punctate derm; with no fascicles at apex. *Scutellum* elongate, densely clothed with white scales. *Elytra* subparallel-sided in basal two thirds, and thence broadly rounded to apex; base strongly sinuate; the common callus at top of declivity subtubular, giving rise to a very dense, long, sharply pointed fascicle in male, much reduced in female; lateral margin not sinuate; intervals slightly convex, with a few inconspicuous, scattered, irregular callosities; in fresh specimens with two or three irregular rows of white setae that are most conspicuous toward the sides in posterior half; striae not coarsely impressed; covered for the most part by the very dense scaling; the tenth stria traceable from base to apex. *Legs* densely squamose and punctate; femora strongly toothed, tooth on fore femora largest; tibiae angulate near base, occasionally with a small tooth on outer edge at angulation. *Sternum* with mesosternal receptacle strongly produced, extending to a plane below that of fore coxae, its walls very steep, somewhat concave externally on the oblique hind walls, apex much more produced than middle or anterior part of receptacle which slants rapidly dorso-anteriorly; metasternum with an irregular surface, fore margin raised, with only scattered setae in median area. *Venter* dull, rather coarsely punctured, each puncture bearing a short squamiform seta and with a patch of squamae behind the metacoxa; first ventrite concave in male, slightly convex in female. Length 7–10 mm., breadth 3.5–6 mm.

Fairmaire gave the locality for this species only as "Iles Viti." I have before me 31 specimens collected in July 1924 on Moala Island by E. H. Bryan, Jr., and R. H. Beck. I collected a number of specimens from various localities in Fiji in 1938.

This species is easily recognized by the characters given in the key. In addition, the mesosternal receptacle is formed differently. On this species the receptacle is much more produced at the apex than at the middle or near the base, and this character alone will separate *B. unipenicilla* from the other species in which the receptacle is less produced at the apex than it is near the base. On this species the receptacle slopes dorso-anteriorly, whereas on the other Fijian species it slopes dorso-posteriorly. The receptacle on this species more closely resembles that of the genotype, *B. undulata,* than it does the other Fijian species.

2. **Blepiarda lophotes** Pascoe.

Pascoe: Jour. of Ent., vol. 2, p. 432, 1865.

Derm black, antennae and tarsi reddish brown; densely clothed above with pale brown and white scales, the white scales forming a rather vague, pale triangle on the elytra from the fascicle at the top of declivity to humeri, scaling on callosities darker, with a variable, irregular patch of white scales on elytra above metacoxae.

Head with a distinct median sulcus that is somewhat interrupted at its middle, but becomes deeper anteriorly to terminate in a shallow interocular fovea; interocular area distinctly narrowed from base of rostrum to middle of eyes; squamae dense, those on basal half of median sulcus forming an elongate, conspicuous white patch, scales otherwise pale brown. *Rostrum* of male much thicker and heavier than that of female, distinctly swollen before base, coarsely punctured from base to apex, very densely squamose from base to near apex which is obtusely angulate, from insertion of antennae to mandibles, in dorsal outline; in female the rostrum is gradually

narrowed from base to insertion of antennae and is only distinctly punctate and squamose from base to antennae, thence cylindrical, very minutely punctate and shiny to apex. *Antennae* in male inserted just behind mandibles; scape reaching upper margin of eye, slender to apical third where it is clavate and densely squamose, almost as long as funiculus; first two funicular segments very long, subequal in length, two longer than three to seven inclusive which are transverse and moniliform; club one fourth longer than second funicular segment, finely setose; funicular segment one with scales on outside and a few inconspicuous setae below, two with a few elongate setiform scales on outside but very long dense hair on inside, three to seven and basal two thirds of club with similar long hair and without scales; in female as follows: inserted distinctly behind middle of rostrum, scape not reaching past middle of eye, first funicular segment only two thirds to about seven tenths as long as the second which is as long as segments three to seven plus about one sixth of club; club slender, as long as the preceding six segments, funicular segments three to seven with a few long setae, funiculus without long hair as in the male. *Prothorax* subtriangular, broader than long (7:5), base sinuate, with a short carina before the scutellum and four feeble callosities across the middle which give rise to feeble fascicles, setae fasciculate on either side of apex; punctures small and round, separated by distances about equal to their diameters, each bearing an oval scale or a short seta. *Scutellnum* subquadrate. *Elytra* subtriangular, especially in male, apex broadly rounded, base strongly sinuate, side margin sinuate, broadly indented above ventrite one; with an elongate callus at top of declivity supporting a thick but short fascicle, very conspicuous in male, but feebly developed or almost obsolete in female; with an elongate basal sutural callus, interval three with an elongate basal callus, four with a shorter callus, elsewhere with a few, scattered, feeble callosities; striae about one fourth as broad as intervals, coarsely impressed at the base, punctures distinct throughout, the tenth stria distinct from base to apex. *Legs* densely squamose, the femora strongly toothed. *Sternum* with anterior margin of metasternum cariniform, median area with setae only, sides densely squamose. *Venter* with first abdominal segment concave in male, convex in female; ventrite five very coarsely, subconfluently punctured, the ventrites otherwise with rounded, well-separated punctures bearing oval scales or an occasional seta. Length, 11–12 mm.; breadth, 5–6 mm.

Described simply from "Fiji." I have five specimens before me, collected on Moala Island by E. H. Bryan, Jr., July 10–13, 1934, and I took more than 100 specimens from a number of localities in 1938.

This is the largest Fijian *Blepiarda* and can be distinguished by its scaling alone.

I had considered a gray form (?) of this species to be distinct from it, because the second segment of the antennae of the female is as long as the first, and not distinctly longer, as in the typical form. On all of these examples the scaling is gray or mostly gray. The males show no differences, however, and their genitalia are similar. I collected a number of specimens of this type, but none in association with the typical form. It may yet be shown that they represent two species, but it is perhaps best that I withhold my description of the gray form.

A New Oodemas from Oahu (Coleoptera, Curculionidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of May 5, 1938)

The following new Oahuan *Oodemas* (Cossoninae) is one of the handsomest of the genus. Because of its purplish coloration and rather large size it may readily be recognized among the Oahuan species.

Dr. Perkins' key to the Oahuan species of Oodemas on page 78, vol. 9, no. 1 of these "Proceedings" (1935), may be amended to include this species as follows: For 6 in dichotomy 5 read 5a, then insert the following lines:

5a. Color distinctly purplish ..... *purpureum*
Color aeneus, not at all purplish 6

Oodemas purpureum, new species.

Derm dark burnished purplish bronze; the prothorax, head and rostrum usually slightly darker and less purplish than the elytra.

Head reticulate, finely and rather sparsely punctate, the punctures becoming more numerous distally; eyes convex, about as broad as long. *Rostrum* subparallel-sided, not expanded distally, about one third longer than the distance between the eyes, usually, but not always, dorsally, longitudinally sinuate with the head; punctures rather small, tending to be longitudinally confluent; epistome rather deeply emarginate in the middle; with a few long, golden setae at apex, otherwise evidently without setae. *Antennae* inserted at the middle of rostrum in male, slightly behind middle in female; scape reaching to slightly behind the posteriar margin of eye; finicle with first segment almost as long as second plus half of third, two as long as three plus half of four, three and four subequal in length, or four appearing very slightly longer than three, five somewhat shorter than four or six, six as long as seven but slightly narrower; club almost twice as long as broad, as long as the preceding five segments together. *Prothorax* about one sixth broader than long (range: 2.6 : 2.3–3.1 : 2.7), conical, basal margin rather strongly convex, almost straightly narrowed on the sides, but usually rather feebly impressed beyond the middle and rarely near the base, longitudinal dorsal outline evenly convex, subcontinuous with the elytra; rather coarsely reticulate, finely and evenly punctate, punctures separated by interstices somewhat broader than the diameters of the punctures, the punctures as broad as two or three reticulations. Elytra elongate-oval, about five eighths as broad as long, roundly or subtriangularly emarginate at the base, almost evenly arcuate on the sides from base to apex; shallowly, vaguely, indefinitely reticulate; discal striae subobsolete or entirely obsolete, marked by rows of shallow punctures that become smaller caudad and minute near the apex, the two or three outside striae well impressed; intervals flat, rather densely, irregularly punctulate, the punctures bearing minute setae. *Legs* with the femora rather slender, evidently impunctate; tibiae compressed, uncus strongly curved; tarsi similar in both sexes, with the first segment slender, as long as third, second segment rather small, but slightly more than half as long as third (4:7), as broad as long, not more than half as broad as the third which is deeply

bilobed, fourth segment slender, inserted at middle of third, as long as second plus third. *Sternum* with the metasternal puncturation but slightly coarser than that on base of first ventrite. *Venter* with first ventrite moderately coarsely and densely punctate near base, punctures smaller behind middle; second ventrite with puncturation similar to that on the apical part of first ventrite; ventrites three and four finely punctate; ventrite five densely and rather finely punctate. Length, excluding the head, 4.2–5.0 mm.; breadth, 2.2–2.5 mm.

Oahu, Hawaiian islands. Holotype female, allotype male stored in Bernice P. Bishop Museum, eight paratypes and one broken specimen collected by me, and 11 paratypes collected by O. H. Swezey a few hundred yards south of Puu Kaaumakua, Koolau Mountains, on the summit trail at 2,500 feet from the dead fronds of *Cibotium menziesii* and *Cibotium chamissoi* on April 28, 1938.

No obvious external characters, in addition to the slight difference in shape and antennal insertion, were found to distinguish the sexes. The sex of the male allotype was ascertained by selecting from the series one of the smaller, more slender specimens and dissecting out the genitalia which are now mounted with the specimen.

This species resembles the Mauian species *Oodemas chrysodorum* and *O. cupreum*. From *O. chrysodorum* it may be easily separated by not having the rostrum expanded distally, in addition to numerous other characters. From *O. cupreum* it may be distinguished by its more distinctly purplish color, larger, more elongate-oval body, and by its longer antennal funicle. On this species the club of the antenna is as long as the preceding five segments, but on *O. cupreum* it is as long as the preceding six segments. It cannot be confused with any of the Oahuan species because of its purplish coloration, although, from the description, it is closely allied to *O. williamsi;* which Dr. Perkins says is distinctly aeneous.

The series of specimens collected were found more abundantly in the harder parts of the *Cibotium* fronds toward the apices than in the softer parts near the bases. Although considerable collecting was done on several other plants in the type locality, no specimens were found on anything except *Cibotium*.

Identification Tables for the Introduced Hawaiian Nitidulidae (Coleoptera)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the Meeting of June 2, 1938)

The Nitidulidae of Hawaii are a well-developed group containing more than 140 species. Most of these species are endemic products and are found almost exclusively in the mountain forests. Considerable difficulty is encountered when anyone desires to identify specimens that come to hand. The present status of the literature on the endemic species renders it almost impossible to identify any but the most aberrant forms. Although there are but few species that are met with by the agriculturist or entomologist in the lowlands, much confusion has occurred in the identification of the species. The purpose of this paper is to present some keys which, it is hoped, will enable one to identify the species that are usually found about crops, vegetable produce, and stored products in the lowlands.

Although one of the species included in this paper has not yet been recorded from elsewhere, there is reason to believe that all of the species are adventitious and that none of them are really components of the endemic fauna. Most of them are widely distributed, and four may be considered to be almost or quite cosmopolitan. The only exception to their all being introduced is *Haptoncus mundus* Sharp, but I believe that that species is either a synonym of some other species or that it will eventually be found in some other region. I have, therefore, called all of the species discussed in this paper "introduced."

There is no conclusive information available to show that any of these species causes primary damage to growing crops in Hawaii. On the other hand, fermenting, overripe, or injured friuts are attacked, and certain stored seeds, cereals, and dried fruits are occasionally damaged. At least two of the species of *Carpophilus* are of some importance about pineapple canneries because they occasionally drop into the fruit in the canning process. Students should refer to Dr. Schmidt's excellent biological studies of the species found in Hawaiian pineapple fields (Ann. Ent. Soc. Amer., vol. 28, no. 4, pp. 475–511, 1935).

KEY TO THE SUBFAMILIES

Abdomen with two or three dorsal segments broadly exposed behind the elytra ..... **Carpophilinae**

Abdomen with only one (exclusive of the pygidium which often gives the appearance of a small terminal segment), or no dorsal segments exposed

behind the elytra which almost entirely or quite conceal the abdomen from above ..... **Nitidulinae**

CARPOPHILINAE

Genus **Carpophilus** Stephens

KEY TO THE SPECIES

In preparing this key, an eyepiece micrometer was used for measurements, and it is assumed that such an instrument will be used by the reader when identifying specimens.

1. Posterior third or half of each elytron with a large, conspicuous, yellowish macula outstanding to the unaided eyes. **C. hemipterus** Linné

   Posterior parts of the elytra dark, or at least never with pale maculae 2

2(1). Elytra with a small, but usually conspicuous yellowish subhumeral spot, otherwise rather uniformly dark; dorsal pubescence usually sparse and inconspicuous; distance across the eyes only about two thirds as broad as the broadest part of the pronotum. **C. humeralis** (Fabricius)

   Elytra with a variable amount of yellowish coloration, but usually without distinct, isolated subhumeral spots; pubescence conspicuous and comparatively dense; distance across the eyes more than two thirds to about three fourths as broad as the broadest part of the pronotum 3

3(2). Elytra along the median line almost or fully as long as the head and prothorax; prothoracic punctures well separated by interstices at least as broad as the punctures ..... **C. maculatus** Murray

   Elytra usually distinctly shorter than the head and prothorax along the median line; prothoracic punctures dense, the interstices usually narrower than the diameters of the punctures; the surface of the pronotum often appearing minutely roughened because of the denser puncturation ..... **C. dimidiatus** (Fabricius)

At least three of the species of *Carpophilus* are pests in food products in addition to breeding in fermenting vegetation. *Carpophilus hemipterus* (Linné) is called the "Dried Fruit Beetle" and infests a variety of dried fruits in stores, warehouses, and homes. *C. dimidiatus* (Fabricius) has occasionally been found in walnuts, cornmeal, macaroni, and popcorn in Hawaii, and *C. maculatus* Murray has similar habits and has been found in walnuts and macadamia nuts in Hawaii but is evidently much less common than *C. dimidiatus, C. humeralis* (Fabricius), our most bulky and shiny species, evidently confines its attacks to fermenting vegetable matter and is usually extremely abundant.

NITIDULINAE

KEY TO THE GENERA

Intercoxal process of the prosternum obviously narrower at its narrowest part than the apex of a fore tibia, only one half or two thirds as broad; dorsum clear yellow or each elytron with three isolated black patches; not over 2 mm. long ..... **Haptoncus**

The narrowest part of the intercoxal process of the prosternum fully as broad or broader than the apex of a fore tibia; dorsum dark, strongly infumated; over 3 mm. long ..... **Omosita**

Genus **Haptoncus** Murray

KEY TO THE SPECIES

Elytra maculate, with a small basal spot, a large median transverse macula, and the apices black; scutellum dark ..... **H. ocularis** (Fairmaire)
Elytra yellow throughout and without black spots; scutellum not dark. **H. mundus** Sharp

Haptoncus ocularis (Fairmaire) (*H. tetragonus* in our literature) is rather common in various fermenting fruits, but *H. mundus* Sharp is evidently uncommon, and few specimens are in local collections.

Genus **Omosita** Erichson

Omosita discoidea (Fabricius).

This species is known in Hawaii by a single specimen in the collection of the Hawaiian Sugar Planters' Association collected by Timberlake from a greasy can on Haleakala, Maui, in 1919. We do not know whether this species is or is not established.

A New Fijian Diathetes Injurious to Pandanus (Coleoptera: Curculionidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of November 3, 1938)

During the Henry G. Lapham Fijian Expedition recently sent out by Bishop Museum, I found a series of a new species of *Diathetes* that may be an important pest of *Pandanus* trees. The importance of *Pandanus* to the culture of the native peoples of tropical Oceania is well known to anyone familiar with the region. At least in eastern Oceania the leaves form the most important source of material for plaited goods available to the natives; they are used for house thatch in many islands; the fruits are eaten by some people; the fibers of the aereal roots are used for cordage, and the wood itself is used in various ways. In some islands probably one of the most important sources of monetary income is the sale of *Pandanus* mats and other plaited goods.

The specimens described in this paper were taken from a recently felled *Pandanus*. It seemed quite evident to me that the beetle attacked a growing, apparently healthy tree. Unfortunately, I had neither time nor opportunity to make a careful survey of the problem or to examine a series of trees. I was attracted to the infestation by one of the weevils walking about on the tree, and, upon chopping open the trunk and limbs, I found their entire hearts destroyed by the larvae which had reduced the substance to a mass of frass. Isolated larvae were also found in the solid wood in various parts of the tree. Whether or not the tree was cut down by a Fijian who was acquainted with the damage done by the weevil I do not know, but it is most unusual to see a *Pandanus* tree destroyed rather than used in some way.

The genus *Diathetes* Pascoe, 1874, now has 23 species. These have an interesting distribution in Oceania. Most of the species are found in New Guinea and others are recorded from the Moluccas, Cape York Peninsula of Australia, Bismarks, New Hebrides, New Caledonia, Samoa and now Fiji. None are known from the Solomons, but species surely occur there. This almost continuous distribution is quite like certain other genera of weevils, and is, I believe, of particular zoogeographical significance.

The paper is illustrated by Miss Margaret Poor, Assistant Entomologist at Bishop Museum.

Diathetes pandanae new species (figs. 1 and 2).

Color black throughout; derm shiny in some lights, dull in others; disk of the pronotum less coarsely reticulate than elsewhere and therefore quite shiny, especially near the base; dorsal reticulation elsewhere, when clean, usually giving prismatic reflections that produce a slight iridescent cast in certain lights.

Head moderately shiny; comparatively densely punctate, the punctures small, rounded, distinct, usually separated by more than their diameters, those near the base coarser, each normally containing a minute, hardly discernible seta; eyes with a shallow groove around their posterior margins, the distance between them very slightly greater than the breadth of the apex of the scape; with a small ovate interocular fovea that is about half as long as the breadth of the interocular area and has its base just below the narrowest part of the interocular area. *Rostrum* evenly arcuate, parallel-sided from the base to the insertion of the antennae, there conspicuously narrowed, more sharply in the female, thence subcylindrical to

FIG. 1.—*Diathetes pandanae* Zimmerman, adult.

the apex which at most is just perceptibly dilated; finely and moderately densely punctate behind the antennae in the female, thence shiny and extremely minutely punctate, appearing impunctate, to the apex, the punctuation coarser and continued to the apical third in the male, the punctures containing minute, hardly discernible setae; without dorsal or lateral costae or striae in either sex; apex oblique at the sides, almost straightly truncate, but very slightly concave in the middle; mandibles with the tooth above the ventral tooth largest and surrounded on its outer side by a groove. *Antennae* with the scape slightly, but distinctly, longer than the funicle including the club, coarsely reticulate, with a few scattered, shallow punctures; funicle with the first segment, measured along its inner edge, as long as two plus three, only slightly broader than two, two one-tenth shorter than three plus four which are equal, five-eighths as long as broad, five and six successively more transverse; club as broad as long, asymmetrical, as long as the preceding four segments together, the basal glabrous segment as long as the preceding three segments together, with a single whorl of setae near the middle. *Prothorax* as broad as long, broadest across the base, narrowing anteriorly with a gradual curve, but very shallowly, just perceptibly concave behind the middle, the outline slightly interrupted just

before the subapical constriction which is sharply angulate and deep, the groove of the constriction not continued entirely across the disk, but interrupting the longitudinal dorsal outline when viewed from the side; the apical part tubulate, as broad at the lateral edge as the antennal club, the apical margin just perceptibly concave at the apex; basal half of the medial part of the disk containing an irregular, more shiny area; apical half of

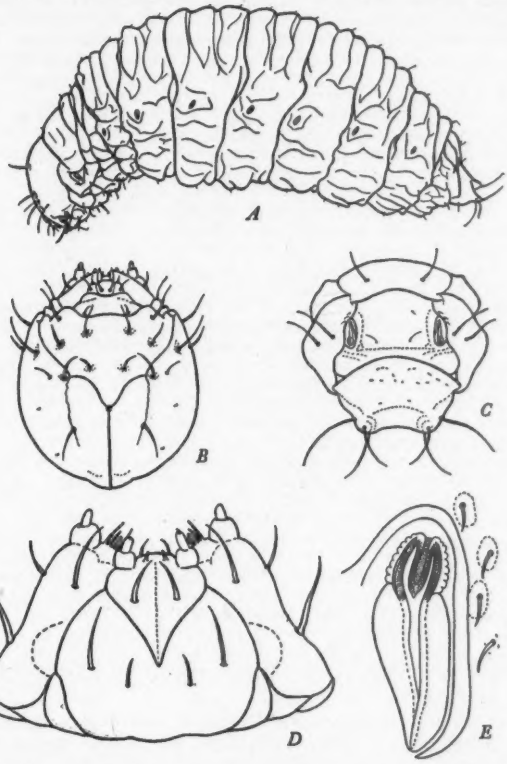

FIG. 2.—*Diathetes pandanae* Zimmerman, larva. A, side view; B, dorsal view of head; C, caudal view; D, ventral view of labium and maxillae; E, right thoracic spiracle.

the dorsum with a vague, shiny, less punctate median line that sometimes appears slightly raised; punctures small, those in the shiny areas minute, those on the sides of the disk larger, becoming progressively larger laterally and very coarse on the pleural areas, dorsal punctures separated by about two to five times their breadths; the scutellar lobe well developed. *Scutellum* distinctly longer than broad, occasionally twice as long as broad. *Elytra* shaped as illustrated; broadest across the posterior parts of the humeri and there four-fifths as broad as long; striae one to six reaching, or almost reaching the basal margin, seven and eight ending on the humerus, nine and ten not reaching the base, two bent slightly inward toward one at

the base, one and two, three and eight, four and seven, five and six, nine and ten joined at their apices, the first five well impressed throughout, six, seven and eight usually not, or indistinctly impressed between the punctures, at least within the basal half, the punctures in these striae larger than those in the distal striae where they are only slightly broader than the striae, ninth stria bent downward, or conspicuously angulate, above the fore margin of the metacoxa, indistinctly punctate except at the apex; intervals slightly convex, minutely but rather coarsely reticulate, each with one or two irregular rows of minute punctures bearing hardly discernible setae, the first interval narrower than the second. *Legs* with the femora rather strongly clavate, the hind pair rather conspicuously subangulate in the distal third below, rather evenly punctate throughout, the punctures round, shallow, well separated, with short setae scattered along the ventral edge in the female, with long, dense, hairlike, amber setae in the male; tibiae with the outer apical angle not produced, striae coarsely punctate, ventral edge with an impunctate, very elongate, triangular median area bounded on either edge with a row of very dense, stiff, short, erect, amber setae, the inner row on the two hind pairs and the outer row on the fore pair most distinct and conspicuously developed, ending at the apices in two long slender fascicles; coxae without tufts of hair; third hind tarsal segment slightly broader than long. *Sternum* with the prosternum densely and coarsely punctate, prosternal epimera and mesosternum finely punctate, mesosternal episterna shiny, closely set with large punctures, mesosternal epimera dull, coarsely punctate; metasternum broadly concave below, more so in the male, the concave part shiny and finely punctate in the male, bare in the female, but conspicuously setose in the male, with a slightly posteriorly oblique stria on either side beginning at about the middle and ending at a point more than halfway from the middle to the posterior margin, the distance between the anterior ends of the striae half as great as the breadth of the intercoxal process of the venter, the area between the inner edges of the coxae and the episterna dull and for the most part coarsely punctate, metasternal episterna dull, coarsely and densely punctate. *Venter* shiny down the middle, dull on the sides, the first ventrite concave between and behind the coxae in both sexes, finely, remotely punctate and bare in the concave area in the female, coarsely, densely punctate and conspicuously setose in the male, the other ventrites finely punctate in the middle, coarsely and more densely punctate on the sides. *Pygidium* very coarsely and densely punctate, the punctures bearing coarse setae, bounded by a raised, densely setose rim, as long from the elytral suture to the apex as broad at the elytra, the distal margin very slightly convex, almost truncate, half as broad at the apex as the base in the female, more than half as broad in the male, slightly more convex in the male than in the female. Length: 11–13 mm.; breadth: 5.5–6.0 mm.

Fiji: Vanua Mbalavu, Lau Province. Holotype male, allotype female, Bishop Museum numbers 1150 and 1150a, seven paratypes, one immature specimen and two larvae collected by me from the trunk and limbs of a *Pandanus* tree on the seashore near the south boundary of Loma Loma, August 8, 1938.

The only other species of *Diathetes* in the eastern Pacific are *D. buxtoni* Marshall and *D. lyriger* Marshall (Insects of Samoa, vol. IV, fasc. 5, pp. 316–319, 1931). *D. pandanae* can easily be distinguished from both of the Samoan species because it is entirely black, whereas *D. buxtoni* has brown elytra, and *D. lyriger* is black and testaceous.

The mature larva is 20 mm. long and 9 mm. high. The drawings showing the diagnostic details are self-explanatory.

Proterhinus of Hawaii (Coleoptera: Aglycyderidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of December 1, 1938)

In the last issue of these "Proceedings" I presented a paper on the *Proterhinus* of Lanai, and now I wish to offer a key to those of the island of Hawaii.

The species of *Proterhinus* found on Hawaii form an assemblage of very closely allied, unspecialized or slightly modified, rather ordinary forms that are most difficult to separate by description or synoptic table. The peculiarly evolved and oddly modified groups found on Kauai and Oahu, for example, are absent from Hawaii. The entire Hawaii group, as I understand it, has not evolved to anywhere near the extent that those of Oahu have and apparently is much younger.

I am not altogether satisfied with the key as it now stands. The characters of differentiation between several of the species are, it seems to me, weak. Additional studies and more field work will produce results that should modify or strengthen parts of the key. I have worked entirely from Bishop Museum's share of the typical specimens from Dr. Perkins' Fauna Hawaiiensis collection.

Three species are omitted from the key because I have seen no specimens of them; they are discussed after the key. Blackburn referred some Hawaii specimens to *P. debilis* Sharp, but I am inclined to believe that some error was made. I have therefore not considered *P. debilis* as being found on Hawaii.

The names in parentheses refer to the food of the species.

KEY TO THE HAWAII PROTERHINUS

1. Humeri obviously, and usually conspicuously, almost or quite acutely angulate, projecting forward around the basal angles of the prothorax 2
   Humeri not angulate and not projecting forward around the hind angles of the prothorax, but rounded off 12

2(1). Pronotum with long or comparatively long, conspicuously erect, straight, or almost straight, spike-like setae in addition to the depressed squamules; elytra bristling with even longer setae; a very "spiny" species (polyphagous) ..... **blackburni** Sharp
   Pronotum without long erect setae, with curved, decumbent, subsquamiform setae only, at least never with erect setae on the disk 3

3(2). Elytra with all or almost all of the shorter setae erect and not squamiform, not forming distinct patches of condensed, prostrate, subsquamiform setae except slightly on the scutellar callosities 4
   Elytra with numerous conspicuous patches of condensed, prostrate, squamiform setae 5

4(3). Second elytral intervals comparatively deeply impressed in the basal half, the suture therefore appearing elevated; scutellar

callosities distinct, but low; long setae quite dense on the sides and declivity (*Cibotium, Sadleria*) ..... **ferrugineus** Perkins
Second elytral intervals not impressed, disk flattened, scutellar callosities obsolete; long setae rather sparsely scattered.
desquamatus Perkins

5(3). Lateral foveae of pronotum obsolete 6
Lateral foveae of pronotum distinct 7

6(5). Sides of pronotum from base to subapical constriction very densely clothed with a large patch of white and golden squamules that almost entirely hides the derm; first elytral interval bare of squamules in basal fourth ..... **similis** Blackburn
Sides of pronotum without such a dense patch of squamules; first elytral interval with squamules on the basal fourth.
tarsalis Blackburn

7(5). Scutellar callosities obsolete (*Straussia*) ... **subangularis** Perkins
Scutellar callosities distinct 8

8(7). Humeri forming distinct obtuse angles; elytra with coarse raised and depressed areas ..... **vulcanus** Perkins
Humeri forming obvious acute angles; elytra variably sculptured. 9

9(8). Eyes subtriangular, obviously conical; elytra with a single longitudinal costa representing the fifth interval, running from near the posterio-lateral corner of the scutellar callosity to apical third, without very conspicuous patches of condensed squamules.
peles Perkins
Eyes more hemispherical than conical; elytra with conspicuous patches of condensed squamules 10

10(9). Dorsum for most part reddish, with only small areas dark.
rufescens Perkins
Dorsum usually for most part dark, if the elytra are mostly reddish then the pronotum at least is dark 11

11(10). Disk of elytra distinctly and broadly flattened .... **affinis** Perkins
Disk of the elytra convex ..... **gracilis** Sharp

12(1). Sutural intervals rather distinctly elevated from base to declivity.
tarsalis Blackburn
Sutural intervals not elevated 13

13(12). With a conspicuous pale humeral patch of condensed squamules (be sure your specimen is clean) 14
Without conspicuous pale humeral patches 15

14(13). Elytra obviously impressed down the middle, conspicuously maculate ..... **hypotretus** Perkins
Elytra convex and not at all impressed down the middle, normally uniformly very dark throughout (*Straussia*).
subangularis Perkins

15(13). Antennae entirely very dark ..... **similis** Blackburn
Antennae usually for the most part reddish, at least the basal segments reddish (polyphagous) ..... **deceptor major** Perkins
deceptor konanus Perkins

I can find no dependable characters on the varieties of *P. deceptor* in the collection at Bishop Museum to warrant their separation.

SPECIES OMITTED

1. **Proterhinus ater** Perkins. Proc. Haw. Ent. Soc. **4**: 356, 1920.

This species is closely allied to *P. similis* Blackburn, and Dr. Perkins says that he may have previously confused it with that species. Judging from the description, it is probable that this species

would run to *similis* in the key, but I cannot list characters to separate the two species. From Kona, 3,000 feet.

2. **Proterhinus eurhynchus** Perkins. Fauna Haw. 2: 239, pl. x, fig. 9, 1900.

This species was described from two males from Kilauea. It is supposedly allied to *P. affinis* Perkins, but is darker in color.

3. **Proterhinus hawaiiensis** Perkins. Fauna Haw. 2: 236, pl. x, fig. 8, 1900.

This large species (4.0–4.75 mm.) was described from a female from Kona, 3,000 feet, and a male from Olaa, 2,000 feet. The elytra are somewhat depressed along the suture. It probably will fall in couplets 8 or 11 in the key.

4. **Proterhinus blackburni hystrix** Sharp. Trans. Ent. Soc. Lond., p. 527, 1881. Perkins, Fauna Haw. 2: 246, 1900.

It seems to me that there is little reason for maintaining the name *hystrix* as a "variety" of *blackburni*. I cannot find reliable characters on the specimens in the Fauna Hawaiiensis collection to separate the two supposed forms. *P. blackburni* is a variable species.

Cis of Maui and Lanai (Coleoptera, Ciidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of December 1, 1938)

There have been more than 30 species of *Cis* described from the Hawaiian Islands, but no keys to aid in their identification have been prepared. The principal reason for the writing of this paper is partially to alleviate this condition by presenting a synoptic table of the species found on the islands of Maui and Lanai. Unfortunately, it is impossible to formulate a key including all of the Hawaiian species at this time, because the types and a complete collection of the species are not available in Hawaii.

The following key includes 17 species. Ten of these species probably live on all of the other main islands, two have been found only on Maui and Hawaii, one is confined to Lanai and four to Maui. Therefore, the key may be of use in aiding to identify the commoner species of all the islands.

The following species are omitted from the key: *Cis nudipennis* Perkins, *Cis setarius* Sharp and *Cis mimus* Perkins. The reasons for their omissions are discussed under the species headings following the key.

KEY TO THE CIS OF MAUI AND LANAI

1. Elytra finely and distinctly strigose ..... **haleakalae**
   Elytra not strigose 2
2(1). Elytra maculate 3
   Elytra immaculate, concolorous or almost so 10
3(2). Elytral setae very dense and conspicuous, usually giving the dorsum a shaggy appearance; dorsum dull and coarsely sculptured 4
   Elytral setae sparse, often hardly discernible; dorsum most often rather shiny and not coarsely sculptured 5
4(3). Dark markings on the elytra not fused to form irregular transverse fasciae, the elytra pale with dark markings ..... **signatus**
   Elytra appearing dark with pale markings, the dark patches fused and forming irregular fasciae enclosing pale patches .... **roridus**
5(3). Elytra with very fine, scattered, long hair, at least along the lateral margin, some of the hairs almost or quite as long as the breadth of the eyes, long hairs scattered over the dorsum in unabraded specimens; an infuscated, indefinitely maculate, usually shiny, variable species ..... **tabidus**
   Elytral setae all short or very short 6
6(5). Pronotum yellowish ..... **nigrofasciatus**
   Pronotum entirely, or for the most part, black 7
7(6). Elytra densely and usually coarsely punctate throughout; pronotum with a slightly brassy sheen, usually almost straightly expanded on the sides from the base to beyond the middle 8
   Not so; elytra indistinctly, very shallowly and minutely punctate 9

8(7). Elytra very densely and rugosely punctate throughout .... **nesiotes**
Elytra not rugosely punctate, punctures fine and rather distinctly separated on the declivity ..... **cognatissimus**

9(8). Pronotum with a broad transverse dark band, the base and apex pale; elytra with a short transverse dark fascia across the suture at about the middle, otherwise pale yellowish with the wings outlined beneath the translucent derm ..... **bicolor**
Pronotum almost entirely black, with the apex at most slightly paler; elytra without a transverse fascia across the suture, but with a lateral fascia only; a large dark species ..... **bimaculatus**
Pronotum almost entirely pale, with at most a dark spot but without a dark band; a pale yellowish species ..... **simulator**

10(2). Elytra with very fine, long hair, at least along the lateral margin, some of the hairs almost or quite as long as the breadth of the eyes, long hairs scattered over the dorsum in unabraded specimens ..... **tabidus**
Elytral setae all very short, most often inconspicuous 11

11(10). Derm pale yellowish brown or reddish brown, the elytra somewhat translucent and with the wing veins usually showing through them as distinct lines 12
Derm usually very dark brown or black in mature specimens ... 14

12(11). Lateral prothoracic carina visible and very conspicuous from base to apex and its actual apex and junction with the apical margin distinct when viewed from directly above; prothorax usually darker than the elytra in color ..... **immaturus**
Lateral prothoracic carina not or hardly visible beyond the middle, its apical part always hidden by the sides of the pronotum when viewed from directly above 13

13(12). Dorsum coarsely punctate; setae conspicuous, those on the prothorax usually denser, coarser and prostrate, especially toward the sides and there usually tending to be somewhat swirled in arrangement; male with the front of the head produced on either side into a variable tooth ..... **insularis**
Dorsum shiny and appearing smooth, but with minute, shallow, hardly discernible punctures; setae very inconspicuous, disk of prothorax appearing almost bare of setae ..... **chloroticus**

14(11). Elytra with conspicuous, rather dense white setae that are easily seen under low magnification; prothorax rather dull and coarsely punctate ..... **porcatus**
Elytral setae minute and inconspicuous, discernible only under high magnification; prothorax usually finely punctate 15

15(14). Pronotum reticulate but almost impunctate; male without prominent processes on the head; very small, slender species obtained by beating limbs 16
Pronotum distinctly but finely punctate throughout, male with two prominent cephalic teeth; a stout, rather short, medium sized species obtainable from shelf fungi ..... **pacificus**

16(15) Lateral margin of the prothorax evenly and continuously rounded from base to apex, the baso-lateral angles conspicuously rounded off ..... **evanescens**
Lateral margin of the prothorax not evenly rounded, but straightly expanded from the base to about the middle, thence more rapidly rounded to the apex, baso-lateral angles distinctly angulate (remove an elytron to see this best) ..... **laeticulus**

1. **Cis haleakalae** Perkins. Fauna Haw. 2: 262, pl. x, fig. 17, 1900.

Maui and Hawaii.

I have not seen a specimen of this species. The type from Mt. Haleakala, Maui, and one specimen from Kilauea, Hawaii are evidently the only examples known. I have included it in the key on the supposition that Perkins' remark "The sculpture of the elytra is very remarkable, being of a finely strigose character" is unique among the species included here.

2. **Cis signatus** Sharp. Trans. Ent. Soc. Lond., p. 92, 1879.

Cis attenuatus Sharp, Trans. Dublin Soc., p. 165, 1885. Synonymy by Perkins, Fauna Haw. **2**: 261, pl. x, figs. 20, 20a, 20b, 20c, 1900.

All islands.

This is a common, widespread and variable species. I have seen specimens from *Metrosideros, Pteralyxia* and other trees.

2a. **Cis mimus** Perkins. Fauna Haw. **2**: 263, 1900.

Maui.

I have not included this species in the key because I am inclined to believe that it is a synonym of *Cis signatus*. The main reason why Perkins separated *mimus* from *signatus* was evidently because of the reduction of the size of the wings. I believe, however, that they may be subject to variation. I can find no reliable characters on the two specimens from the type series at Bishop Museum to separate the species from *signatus*. A large series of specimens must be dissected to see if the wings do vary in size among members of a colony, and the types should be examined before *mimus* is actually reduced to synonymy, however.

3. **Cis roridus** Sharp. Trans. Dublin Soc., p. 165, 1885. Perkins, Fauna Haw. **2**: 261, 1900.

All the islands.

Like *Cis signatus*, this species is quite variable and widespread.

4. **Cis tabidus** Sharp. Trans. Ent. Soc. Lond., p. 93, 1879. Perkins, Fauna Haw. **2**: 259, 1900.

All the islands.

This is a rather common, widespread, greatly variable species. It may be maculate or immaculate, pale or dark, and I have, therefore, included it in two sections of the key. The long hairs on the elytra are diagnostic. I have seen specimens from *Acacia koa* and *Hibiscadelphus*.

4a. **Cis setarius** Sharp. Trans. Dublin Soc., p. 162, 1885.

Cis apicalis Sharp, same reference.

Cis concolor Sharp, same reference, p. 163; both species synonymized by Perkins, Fauna Haw. **2**: 260, 1900.

I have not included this species in the key because I believe that it is most probably a synonym of *Cis tabidus*. In the large series of

both of these species in the Fauna Hawaiiensis collection at Bishop Museum are specimens that might be placed under either name equally well. I can find no characters to separate them. Because I have not seen the type and because Perkins has more recently described new species related to these two "species," I do not now wish to assume the responsibility of reducing *setarius* to a synonym of *tabidus*. From the tone of Perkins' description in Fauna Hawaiiensis I believe that even he was not very sure that *setarius* was a good species.

5. **Cis nigrofasciatus** Blackburn. Trans. Dublin Soc., p. 162, 1885. Perkins, Fauna Haw. 2: 257, pl. x, fig. 18, 1900.

Lanai.

6. **Cis nesiotes** Perkins. Fauna Haw. 2: 256, 1900.

Maui.

7. **Cis cognatissimus** Perkins. Fauna Haw. 2: 256, 1900.

All the islands.

This is a common, widespread, variable species. It is extremely closely allied to *nesiotes*, and I am not sure that it is a distinct species. I am of the opinion that *nesiotes* is a local race or variation of *cognatissimus*, but because *nesiotes* was described before *cognatissimus*, we must, if any synonymy is to take place, maintain the name *nesiotes*. I believe that a large series of specimens might show an intergradation of the puncturation of the elytra, and that Perkins' use of this character to separate the species is untenable.

Specimens have been seen from *Acacia koa, Pipturus* and under *Coprosma* bark.

8. **Cis bicolor** Sharp. Trans. Ent. Soc. Lond., p. 93, 1879. Blackburn, Trans. Dublin Soc., p. 163, pl. 4, fig. 22, 1885. Perkins, Fauna Haw. 2: 256, 1900.

All the islands.

A specimen from *Hibiscadelphus* has been seen.

9. **Cis bimaculatus** Sharp. Trans. Dublin Soc., p. 161, 1885. Perkins, Fauna Haw. 2: 257, 1900.

Not uncommon on Maui and Hawaii. We may expect to find it on some of the other islands.

10. **Cis simulator** Perkins. Fauna Haw. 2: 259, 1900.

Maui; evidently uncommon.

11. **Cis immaturus,** new species.

Derm reddish brown with the elytra stramineous and somewhat infuscated along the suture, on the declivity and along the lateral margins; pronotum reddish brown and contrasting with the paler elytra.

Head with the fore margin of the front expanded between the eye and clypeus into a convex flange in both sexes, not developed into a distinct tooth in the male; crown conspicuously, densely and rather coarsely punctate, the punctures not separated by interstices greater than their diameters and bearing minute setae; clypeus more finely punctured, the punctures bearing fine hair. *Antennae* with the first segment, excluding the segment-like basal stalk, one third longer than broad, one third longer and about one fourth broader than two, two slightly longer than broad, three and four filiform, three one third longer than two, almost as long as four to six inclusive, four not quite as long as five plus six, five to seven successively shorter and more transverse, five longer than broad, seven broader than long; club almost as long as the preceding six segments together, the first two segments subequal, about as long as broad, regular in outline, terminal segment not quite as long as the two preceding together. *Prothorax* transverse (1.8:1.4), base subtruncate, distinctly margined, lateral margin evenly arcuate from base to apical margin, lateral carinae visible throughout their lengths from directly above, apical margin strongly and evenly convex; junction of the lateral and basal carinae forming a distinct, obtuse angle, the junction between the lateral carinae and the apical margin forming a distinct angle of about 130° and not rounded off; puncturation even, very dense, comparatively coarse, the punctures individually distinct, their interstices smooth and shiny, not broader than their diameters, punctures bearing minute, hardly discernible setae. *Elytra* four sevenths as broad as long, two and one third times as long as the prothorax, parallel-sided in the basal two thirds, semi-translucent, the wing veins not often showing through the derm; dorsal sculpture consisting of dense, fine, shallow, rather poorly defined punctures that bear minute setae; the ventral sculpture occasionally showing through the derm as lineal series of dark spots representing the strial punctures. *Sternum* with the prosternum slightly longer before the fore coxae than a fore coxa, coarsely reticulate, minutely punctate, the intercoxal process almost as broad at its apex as the length of a coxa; metasternum coarsely reticulate, finely punctate and setose, as long between the mid and hind coxae as ventrites two plus three. *Venter* coarsely reticulate, finely punctate and setose; the first ventrite simple in the female but with a conspicuous, oval median setose area in the male. Length: 2.2–2.4 mm.; breadth: 0.9–1.0 mm.

Maui, Hawaiian Islands. Holotype male, allotype female (Bernice P. Bishop Museum type numbers 1151 and 1151a) and 11 paratypes collected by C. N. Forbes from dead "kukui" (*Aleurites moluccana*), at Olowalu, West Maui, May, 1920.[1]

This is one of the larger Hawaiian *Cis* and is quite a distinct species. It might be confused with *Cis insularis* Sharp, but the shape of the prothorax is quite different. On *Cis insularis* the prothorax is expanded distally and broadest beyond the middle and the lateral carinae are almost entirely concealed from above, whereas on this species the prothorax is broader, broadest behind the middle and the lateral carinae are plainly visible throughout their lengths when viewed from directly above.

12. **Cis insularis** Sharp. Trans. Dublin Soc., p. 164, 1885. Perkins, Fauna Haw. **2**: 258, pl. x, fig. 19, 1900.

All the islands.

From *Metrosideros*.

[1] Since this paper was written the author has seen a typical specimen of this species taken at Punaluu, Oahu, May 1932.

13. **Cis chloroticus** Sharp. Trans. Dublin Soc., p. 164, 1885. Perkins, Fauna Haw. 2: 259, 1900.

Maui.

14. **Cis porcatus** Sharp. Trans. Ent. Soc. Lond., p. 92, 1879. Perkins, Fauna Haw. 2: 258, 1900.

All the islands.

A very common, widespread species. From *Sophora, Broussaisia, Myoporum, Acacia koa, Pipturus, Coprosma* and *Metrosideros.*

15. **Cis pacificus** Sharp. Trans. Ent. Soc. Lond., p. 91, 1879. Perkins, Fauna Haw. 2: 255, 1900.

All the islands.

A common species found in shelf fungi.

16. **Cis evanescens** Sharp. Trans. Ent. Soc. Lond., p. 95, 1879. Perkins, Fauna Haw. 2: 264, 1900.

All the islands.

From *Pipturus* and *Coprosma.* Perkins said that "the entire insect is without clothing," but short setae are discernible under magnification.

17. **Cis laeticulus** Sharp. Trans. Ent. Soc. Lond., p. 94, 1879. Perkins, Fauna Haw. 2: 264, 1900.

Probably on all the islands.

A locally common species, but not often collected. From *Freycinetia.*

18. **Cis nudipennis** Perkins. Proc. Haw. Ent. Soc. 7: 513, 1931.

Hawaii, Maui, Lanai and probably other islands.

I have not included this species in the key because I have seen no specimens. Perkins says that it is allied to *Cis tabidus* and was "probably mixed with *setarius* and *tabidus*" in his original Fauna Hawaiiensis collection.

Recent Records of the Introduction of Beneficial Insects into the Hawaiian Islands

(Presented at the meeting of September 1, 1938)

At the meeting of June 2, 1938, a Committee of the following members was appointed for the purpose of "recording purposeful introductions into the Territory, of insects and other invertebrates": O. H. Swezey (Chairman), Experiment Station, H.S.P.A.; D. T. Fullaway, Territorial Board of Agriculture and Forestry; A. C. Mason, Bureau of Entomology, U.S.D.A.; F. G. Holdaway, University of Hawaii; K. Sakimura, Experiment Station, P.P.C.A. The following is the report of this Committee:

A list of introduced beneficial insects was published in the "Proceedings of the Hawaiian Entomological Society," V, pp. 299–304, 1923, under the title: "Records of introduction of beneficial insects into the Hawaiian Islands." This was an effort to list all for which records could be found of introductions up to that time.

In October, 1925, this list was printed in "The Hawaiian Planters' Record," XXIX, pp. 369–376, with a few additions, and supplemented with a list of introductions which had been attempted and failed, or at any rate up to that time not yet known to have become established. A revised "reprint" of this list was issued in 1929, bringing it up to date. This revised "reprint" was included in a book by Dr. F. X. Williams: "Handbook of the Insects and Other Invertebrates of Hawaiian Sugar Cane Fields," on pages 368–377, 1931.

There has been considerable activity in insect introduction since that time, by several institutions as the Experiment Station, H.S.P.A., Experiment Station, P.P.C.A., Territorial Board of Agriculture and Forestry and the U. S. Bureau of Entomology and Plant Quarantine. It is well that these various recent introductions should be segregated and recorded. An attempt is made to list all introductions whether they are known to have become established or not. If any of these introduced insects are recovered in the future, it will be a convenience to refer to this list for dates, etc., of their introductions. Some of them have not yet been specifically identified. In the lists, those marked with an asterisk, are not yet known to have become established, *i.e.*, they have not been recovered in the field.

Records from the files of the Experiment Station, H.S.P.A.

1929.	**Megarhinus inornatus* Walker.	From New Britain.	Predacious mosquito
1930.	*Anagyrus saccharicola* Timberlake.	From Philippines.	Parasite of *Trionymus sacchari.*
1930.	*Small coccinellid: *Pullus* sp.	" "	Predator on *Trionymus sacchari.*

1930.	*Scymnus binotulatus* (?)	" "	Predator of *Trionymus sacchari.*
1930–31.	*Scelio pembertoni* Timberlake.	From Federated Malay States.	Egg-parasite of *Oxya chinensis.*
1930–31.	**Scelio serdangensis* Timberlake.	From Federated Malay States.	Egg-parasite of *Oxya chinensis.*
1931.	**Pullus apiciflavus* (Motsch.)	From Federated Malay States.	Predator on *Trionymus sacchari.*
1934.	*Elis pulchrina* Cameron.	From Guatemala.	Parasite on root grubs.
1934.	**Elis* near *ornaticeps*	" "	Parasite on root grubs.
1934.	**Elis* near *flaviceps*	" "	Parasite on root grubs.
1934.	**Campsomeris* near *hesterae*	" "	Parasite on root grubs.
1934	**Tiphia,* 2 or 3 species.	" "	Parasite on root grubs.
1934.	**Pyrophorus bellamyi* Van Zwaluwenburg.	" "	Predator on root grubs.
1934.	**Eumenes* sp.	" "	Predator on caterpillars.
1934.	**Zethusculus* sp..	" "	Predator on caterpillars.
1935.	**Cissites auriculata* Champion.	" "	Parasite on *Xylocopa varipuncta.*
1936.	**Harmonia arcuata* (Fab.).	From Guam.	Predator on *Aphis.*
1936.	*Cryptogonus nigripennis* Weise.	" "	Predator on *Pinnaspis buxi.*
1938.	*Eupristina verticillata* Waterston.	From Philippines & Hong Kong.	Figwasp on *Ficus retusa.*
(1916.	*Tiphia segregata* Crawford.	From Philippines.	Parasite of *Anomala* grubs.

In 1937 it was first known that this wasp had become established.)

List supplied by D. T. Fullaway of the Board of Agriculture and Forestry of Hawaii. Includes the introductions by the U. S. Bureau of Entomology fruit fly laboratory.

1929.	*Sympherobius barberi* Bks.	Mexico	Established
"	*Aenasius advena* Compere	"	Par. *Pseudococcus virgatus.* Established
1930.	*Hemerobiid		
"	*Diomus margipallens* (Muls.)	"	Established
"	*Nephus bilucernarius* Muls.	"	
"	*Scymnus pictus* Gorh.	"	Established
"	*Red *Hyperaspis*	Panama	
"	*Coccinellid—light brown	"	
"	*6-spotted *Hyperaspis*	"	
"	*Cecidomyid—large	Mexico	
"	**Phanurus*	"	Par. *Pseudococcus*
"	**Pseudaphycus*		" "
"	**Midas pygmaeus*	California	Coccid predator
"	**Coccophagus gurneyi*	"	" "
1931.	**Thripoctenus vinctus* Gahan	Philippines	Thrips parasite

"	**Allotropa* sp.	Panama	Par. *Pseudococcus*
"	**Cleothera* sp.	"	" "
"	*Cecidomyid	"	" "
"	**Diomus* sp.	"	" "
"	**Aenasius* sp.	"	" "
1932.	*Bufo marinus*	Puerto Rico	Established
1934.	*Catolaccus hunteri* Cwfd.	Guatemala	Par. pepper weevil Established
"	*Eupelmus cushmani* (Cwfd.)	"	Par. pepper weevil Established
"	**Eurytoma* sp.	"	Par. pepper weevil
"	**Urosigalphus schwarzi* Cwfd.	"	" " "
"	**Aphycus clauseni* Timb.	California	Par. *Eriococcus*
1936.	**Opius cereus* Gahan	Brazil	Par. fruit-fly
"	**Opius bellus* Gahan	"	" "
"	*Staphylinids	"	" "
"	**Pentilia egena*	"	diaspine coccid predator
"	**Ladoria desarmata*	"	diaspine coccid predator
"	**Opius persulcatus*	East Indies	Par. fruit-fly
"	**Opius longicaudatus*	" "	" "
"	**Dirhinus* sp.	" "	" "
"	**Spalangia* sp.	" "	" "
"	**Opius perproximus* (Silv.)	West Africa	" "
"	**Opius caudatus* (Szep.)	" "	" "
"	**Hedylus giffardii* (Silv.)	" "	" "
"	**Opius* sp. (black)	" "	" "
"	**Opius* sp. (red)	" "	" "
"	**Opius* sp. (short ovipositor, large head)	" "	" "
"	**Tetrastichus* sp.	" "	" "
"	**Opius* sp. (black, long ovipositor)	" "	" "
"	**Opius* sp. (black, stout)	" "	" "
"	**Hedylus* sp. (large, yellow)	" "	" "
"	**Opius crawfordi* (Vier.)	Mexico	" "
"	**Opius anastrepha* (Vier.)	Puerto Rico	" "
1937.	**Macrocentrus ancylivora* Rohw.	New Jersey	Par. Lepidoptera
"	**Glypta rufiscutellaris* Cresson	" "	" "
1938.	*Cyrtorhinus fulvus* Knight	Philippines	Pred. *Megamelus proserpina.* Established
"	**Paranagrus* sp.	"	Par. *Megamelus proserpina*
"	**Ootetrastichus* sp.	"	Par. *Megamelus proserpina*
"	*Eupristina verticillata* Waterst.	P. I. & Hong Kong	*Ficus retusa* fig wasp. Established 1938
"	**Comperiella bifasciata* How.	P. I. & Japan	
"	**Coccidophilus citricola* Brethes	California	Diaspine coccid predator
"	**Syntomosphyrum indicum* Silv.	Fiji	Fruit fly parasite
"	**Cryptognatha nodiceps* Mshl.	"	Diaspine coccid predator

These earlier introductions were recently found established.

1909.	*Sphaeridium scarabaeoides* (Linn.)	Europe	Found established	1937
1923.	*Copris incertus* var. *prociduus* Say	Mexico	" "	1928
1923.	*Onthophagus incensus* Say	Mexico	" "	1934
1923.	*Aparteles glomeratus* (Linn.)	Japan	" "	1934

LIST OF NATURAL ENEMIES OF PINEAPPLE PESTS IMPORTED AND LIBERATED BY THE EXPERIMENT STATION OF THE PINEAPPLE PRODUCERS COOPERATIVE ASSOCIATION DURING THE PERIOD 1930–1938

Supplied by K. Sakimura

Year	*Species*	*Source*	*Host*
1930	*Lobidiplosis pseudococci* Felt	Mexico	*Pseudococcus brevipes*, predator
1930–1931	**Thripoctenus russelli* Crfd.	California	*Thrips tabaci*, parasite
1932	**Zaplatycerus fullawayi* Timb.	Panama	*Pseudococcus brevipes*, parasite
1932–1934	*Thripoctenus brui* Vuillet	Japan	*Thrips tabaci*, parasite
1931–1937	**Pseudiastala nebulosa* Coq.	Panama, British Guiana, Guatemala, Trinidad	*Pseudococcus brevipes*, predator
1933	*Cryptolaemus montrouzieri* Muls. (Experimental mass liberation)	California	*Pseudococcus brevipes*, predator
1935	**Dicrodiplosis guatemalensis* Felt	Guatemala	*Pseudococcus brevipes*, predator
1935	**Synaspidia pretiosa* (Timb.)	Guatemala	*Pseudococcus brevipes*, parasite
1935	**Aenasius colombiensis* Comp.	Colombia	*Pseudococcus brevipes*, parasite
1935–1937	*Anagyrus coccidivorus* Doz.	Brazil	*Pseudococcus brevipes*, parasite
1935–1937	*Hambletonia pseudococcina* Comp.	Brazil, Colombia, Venezuela	*Pseudococcus brevipes*, parasite
1936	**Lithobius* sp.	Ohio	Symphylid, predator
1935–1936	**Hyperaspis c-nigrum* Muls.	Brazil	*Pseudococcus brevipes*, predator
1936	*A coccinellid	Brazil	*Pseudococcus brevipes*, predator
1936	**Synaspidia* sp.	British Guiana	*Pseudococcus brevipes*, parasite
1937	**Hyperaspis* sp.	Brazil	*Pseudococcus brevipes*, predator
1937	**Diomus* sp.	Brazil	*Pseudococcus brevipes*, predator
1938	**Scymnus apiciflavus* Motsch.	Malay	*Pseudococcus brevipes*, predator

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